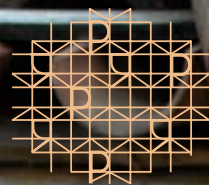


A woman and a young child are shown holding a branch of a lac tree. The woman, on the left, is wearing a blue shirt and a green sari, and has a small pink earring. The child, on the right, is wearing an orange shirt. They are standing in front of a building with a tiled roof. The background is slightly blurred, focusing attention on the subjects.

प्रदान
Pradan

PROFESSIONAL ASSISTANCE
FOR DEVELOPMENT ACTION



Lacquered Dreams

Promoting livelihoods through lac





Hope Undaunted

Life isn't all a bed of roses for Sushila and her husband, Walter Tuti. Sushila and Walter live in Gutwa, a quiet village in Khunti district, Jharkhand. Devoid of any basic amenities such as nearby water resources, electricity, roads, sanitation, schools or hospitals, their lives are a constant struggle. The house they live in is far away from the hamlet, amidst clusters of *palash* (*Butea monosperma*) and *ber* (*Zizyphus mauritiana*) trees. This separateness is something they seem to enjoy. Walter Tuti talks fondly about his trees and the jungle—his home and his source of livelihood for generations.

Walter and Sushila have been rearing lac insects on their *palash*, *ber* and *kusum* (*Schleichera oleosa*) trees for years, with meagre returns. But this time around, they have a different tale to tell. In 2007, Walter and Sushila earned Rs 35,000 from lac cultivation. For the Tuti family, thanks to this income, their dream of better days has come true. They have renovated their house. Two of their children are now going to school. They have bought a pair of bullocks. This is not all. They have been able to pay of the loan they had taken many years ago by mortgaging their land. Walter beams with satisfaction as he talks about this. "It was our ancestral land. Our family is still not divided in *Khatiyani*, and joint property is considered to be pride of the family. We had mortgaged that land when we were in dire straits a few years back; but thanks to the income from lac rearing, we could plough the land ourselves this year."

Many other lac rearers in the villages of Khunti have similar stories to share. Kripa Tuti of Setagarha village has managed to earn Rs 20,000 from lac and plans to deposit at least some part of it in her bank account, which she has acquired few months ago. "For contingency," she says with profound prudence. Bahura Devi of Raidih plans to cultivate paddy with her husband, Jagat Mahto; her family can now buy ration for the next six months. Her neighbour, Lakshmi Devi, wants to repair her house and dreams of sending her daughter to a "big" school now. **Such happy tales are testimony to the fact that lac rearing is making a comeback in Khunti and enabling poor families to earn their livelihoods from the forests, which have been their homes for generations now.**

Pradan has been a partner in the journey of more than 2,500 such farmers of Khunti, helping them break the shackles of poverty and live a life of dignity and self-sustenance. A voluntary organisation working to promote sustainable livelihoods for the rural poor, Pradan firmly believes in identifying and developing specific sectors that have the potential to provide better livelihoods to the rural poor on a large scale. Lac rearing is one such sector, the huge potential of which still lies untapped. This activity can generate higher incomes for thousands of poor families.

Understanding Lac

Lac is a natural resin produced by a tiny insect, *Kerria lacca* (Kerr), which is cultured on shoots of several species of trees, mainly *palash*, *kusum* and *ber*. This scale insect is a parasite, sipping the sap of the host trees. A fully-grown insect is about 0.6 mm long and 0.25 mm broad. The lac insect is a bivoltine insect, producing two broods a year.

surplus stock sold to other rearers. Lac that is sold for further processing is called stick lac, or raw lac (because the lac is stuck on the stick and is sold as it is or after scraping).

There are two main strains of the lac insect—Rangeeni and Kusumi. The primary hosts of Rangeeni are *palash* and *ber* and that of Kusumi is the *kusum* tree. Both have two cropping cycles.

Rangeeni has *Baishakhi* and *Katki* cycles, named after their respective maturing periods, *Baisakh* (April–May) and *Kartik* (October–November) whereas Kusumi has the *Jethwi* and *Agahani* cycles maturing in *Jeth* (May–June) and *Agahan* (January–February) months.

The Kusumi variety is superior in colour, resin content and other properties and fetches a higher price. In 2007–08, Baisakhi ranked first (38.66%) followed by Katki (27.39%), Agahani (18.10%) and Jethwi (15.85%), with respect to the share of production in the different crop cycles.

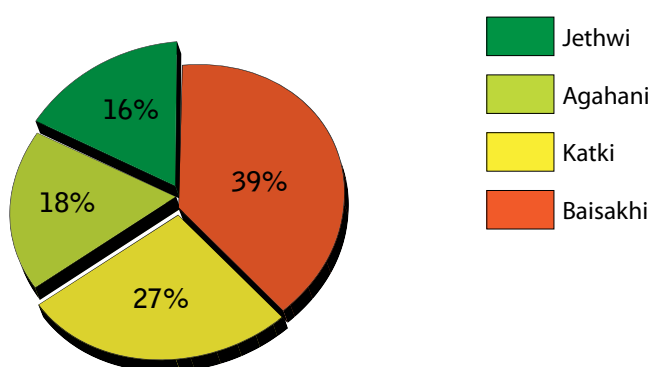


Brood lac, the seed material

Lac encrustations, which contain mature female insects about to give birth to young larvae, are called brood lac, the seed material. The trees are inoculated with the brood lac, so that young larvae can settle on the fresh twigs of the host plants and suck their sap. The newborn insects swarm up the branches, select appropriate places and settle down. In 2–3 days, the insects start secreting a fluid to protect themselves. This fluid solidifies to form a crust around the insects. This crust, when mature, is scraped off the trees and harvested as lac.

Lac is harvested for different purposes. The timing too of the harvest varies, depending on the variety of the crop. For example, brood lac is harvested for inoculation. Brood lac is often used by the rearer himself, and the

Percentage Share of Production of Lac in 2007–08



VARIETY OF LAC	CROP CYCLE	INOCULATION OF BROOD LAC	HOST PLANT	HARVEST
Rangeeni	Katki	June–July	Palash	October–November
Rangeeni	Baisakhi	October	Palash, Ber	June–July
Kusumi	Aghani	June–July	Kusum, Semialata, Ber	January–February
Kusumi	Jethwi	January–February	Kusum	June–July



(Source: *Lac Statistics at a glance*, 2008 by Indian Institute of Natural Resins and Gums)



Processing of Lac

Stick lac is scraped from the tree to break the encrustation and then ground. This is done to break the crude lac into smaller particles, to facilitate washing and clear out impurities. Depending on the colour, wax content and other properties, the stick lac is graded before being processed. The lac is sieved to separate the larger particles such as stone, sand and wood pieces. This is then washed and dried in the shade. The grinding and washing process helps dislodge the embedded lac insects in the lac cells. The dye that comes out in the washing process can be used for dyeing silk and wool and is also used in soft drinks. The washed and dried lac is then winnowed and sieved to further remove impurities and graded. The lac

thus obtained is called seed lac because of its particulate nature.

Seed lac is used to make shellac or button lac. Shellac contains wax, resin and colour. Products of shellac are Dewaxed Shellac, Bleached Shellac and Aleuritic acid. Aleuritic acid is widely used in the cosmetics industry.

CLASSIFICATION OF LAC-DERIVED RAW MATERIAL

Raw lac	Scraped lac/Stick lac
Semi-refined lac resin	Seed lac
Refined lac resin	Shellac, button lac, dewaxed decolourised lac, bleached lac, etc.
By-products	Lac dye and lac wax
Lac constituents	Aleuritic acid, jalaric acid, etc.

History

The use of lac was initiated thousands of years ago. The Atharava Veda contains a complete chapter of nine verses devoted to lac. Early references reveal that it was mainly used for medicinal purposes. The famous *Laksha griha* of the Mahabharata was built of lac. During the Mughal emperor Akbar's rule, lac was used as

surface coating material. East India Company initiated the commercialisation of lac in the beginning of the seventeenth century. It was only in nineteenth century that lac emerged as an important export commodity for use in making gramophones, varnishes, etc.

Lac and its many forms



Lac is used in surface coating, adhesives, as insulation coating in electrical appliances, in food, leather, and pharmaceutical and cosmetic industries. Fruits such as oranges, lemons and apples are coated with shellac, extending the shelf life of the products and giving it a shine that other natural products cannot.

Chewing gum and chocolates are treated with shellac for their high gloss and for protection against moisture. The pharmaceutical industry uses shellac as coating for tablets. Printing inks also utilise shellac. Other uses of shellac are in the electrical and electronics industry for the coating of spark plugs, as a bonding material for mica and fibreglass and as an adhesive for chips and solar cells. Manufacturers of special paints use this natural resin as a binder for interior wood finishing and wall sealers.



OTHER APPLICATIONS OF LAC

Surface Coating Industries

- » Heat and waterproof French polish (for glossy and attractive finish on wooden furniture, radio, TV cabinets, musical instruments, etc.)
- » Picture varnish (to protect pictures and paintings against dust, abrasions and humidity)
- » Book varnish
- » Emulsions and oil paints, synthetic enamels and ink

Adhesive Industries

- » Gasket shellac compound (for repair and maintenance of automobile engines)
- » Sealing wax
- » Lac glue (for glass, metal, plastic wood and cloth)
- » Particle board (as partition wall or false ceiling)
- » Making of bangles

Electrical Industries

- » Insulating varnish (in electric motors, transformers and for manufacturing of other laminated products)

Miscellaneous Applications

- » By-products such as lac dye and lac wax
- » Jewellery and ornaments from valuable coloured stones
- » For polishing and sharpening stones

Demand Dynamics

The demand for lac and lac products across the world far exceeds supply. On an average, India produces about 21,000 metric tonnes of lac annually, and contributes around 55% of the total world demand. The other key lac producing countries are Thailand, Indonesia and China. Whereas India and Thailand dominate the world market, China is fast emerging as an important player in the sector. India exports around 80% of its production to around 75 countries across the globe. Germany, US, Italy, Egypt and Indonesia are the key export destinations for Indian lac. The total exports of lac and its value-added products in 2006–2007 were 7362.58 tonnes, generating revenue to the tune of Rs 150 crores.

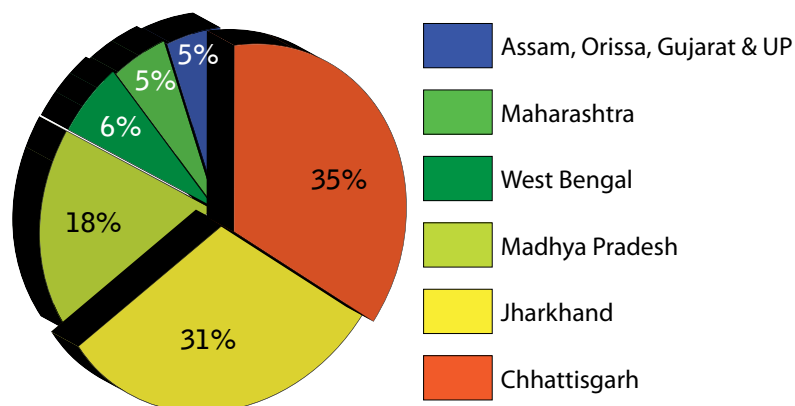
(Source: Lac Statistics at a Glance, 2008, Indian Institute of Natural Resins and Gums)

India exports different grades of handmade and machine-made shellac. Lac is used in these forms because it is eco-friendly, safe, non-toxic, versatile and biodegradable. With an ascending demand for natural products worldwide, there is an ever-growing demand for lac and lac-based products (for example, in fruits and vegetable coatings and as food colour). According to market estimates, the world demands around 40,000 metric tonnes of lac annually. India, China and Thailand's production totals only about 32,000 metric tonnes. There is a huge gap between demand and supply, clearly indicating the huge potential of lac. **The Indian Institute of Natural Resins and Gums (IINRG), formerly Indian Lac Research Institute, estimates that the industry requires at least 20% more raw lac than the existing annual national production. The gap between demand and supply can be translated into generating livelihood options for as many as one lakh farmers.**

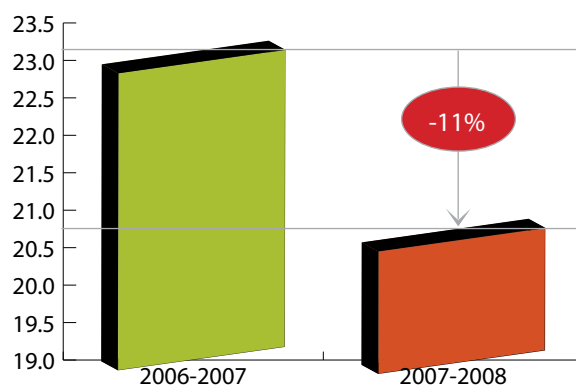


Raw lac, also known as scraped lac

Lac Production in India



Lac production in India (Thousand Tonnes)



Why Lac?

Lac has been a traditional source of livelihood for thousands of tribal families, living in the forest fringes of Jharkhand, West Bengal, Chhattisgarh, Madhya Pradesh and Orissa. These families primarily depend on agriculture for their livelihood, which does not provide them with food security and round-the-year income. These poor families have, through the years, suffered from challenges such as infertile or barren land, low asset base, lack of irrigation facilities, small landholdings, poor linkages with the market and low risk-bearing capacity, forcing them to migrate in search of work. Lac cultivation with its readily available resources, within their habitat, provides some solutions to their predicament.

- Lac cultivation provides income to the farmers during the food insufficient months. The productive cycle of the insect (October–July) matches the lean season for the tribal farmers. Income generated through lac is utilised by the farmers for buying agricultural inputs such as seed and fertilisers. The **supplemental income** from lac also helps the villagers meet their basic needs.
- Growing lac is a **traditional occupation** for the tribals inhabiting sub-hilly tracts, especially in Jharkhand. Thus, the knowledge has been handed over from one generation to another.
- Lac provides **high economic returns**. Kusumi in a hectare of *ber* trees can provide net returns of Rs 3 to 5 lakhs per year. A study carried out in several lac-growing villages of Jharkhand by the IINRG revealed that the income generated from lac cultivation was next only to paddy. In 2003, the income from lac cultivation in Jharkhand was about 28% of the total agricultural income.*

- Lac rearing involves very **simple operations**; it does not require specific skills and takes less time than other agricultural operations. The pruning of host trees, the nylon net-bag technology of brood lac on trees or inoculation, the removal of used up brood lac, or *phunki*, from the trees and the harvesting of the crop are some key operations in lac rearing.
- Lac rearing not only provides livelihood to thousands of lac rearers but also helps **conserve vast stretches of forests**, thereby playing a vital role in protecting our bio-resources.
- The geo-climatic pattern of Jharkhand suits the lac sector, which is gifted with a lot of host trees and is blessed with not very harsh summers, thus providing **ideal conditions for lac culture**.
- The lac sector does not have **any inbuilt gender bias** in its production operations. All activities, from pruning, inoculation, harvesting to even trading can be undertaken equally by men and women. Since it is community-based, self-employed farming, there is no fostering of employee-employer relationships.



* Source: Kumar, K.K., 2008, 'Scope of Lac Cultivation in Employment and Income Generation', *Lac Statistics at a Glance*, Place of Publication: Indian Institute of Natural Resins and Gums



Key Constraints

Despite its huge demand in India and the international market, lac production in India, especially in Jharkhand, has been on a steady decline.

The major reasons for this are:

- The **instability of prices** and the frequent crashing of the prices of stick lac in the local markets. India imports raw lac from Thailand to cater to the demand for processed lac from various countries. This import from Thailand is in excess of the supply shock that happens in India due to poor production. Such imports lead to an increase in supply of raw lac in domestic market, which eventually causes a dip in the prices.
- **Lack of knowledge** of technological advances is another major constraint. While doing a detailed study of the field, Pradan realised that most of the farmers still depend on the traditional practices of lac rearing, which were not very rewarding. Transfer of technology from the laboratories of research organisations such as IINRG had not taken place and the poor cultivators were often nonplussed with issues such as unpredictable weather, damages by pests, etc., which resulted in the high mortality rate of lac insects. The farmers began to look at lac cultivation as an uncertain activity, in which investing their already meagre resources was a risky proposition. This led to many traditional lac cultivators moving away from the activity.
- Another key problem—**brood deficiency**—makes lac cultivation very challenging for the villagers. Brood lac has a very short lifespan and cannot be stored. Therefore, whenever there is a dip in lac production due to adverse climatic conditions, production is constrained by a decrease in brood lac supply. No brood means no crop in the next cycle. To make matters worse, there is not much institutional support to provide lac rearers, who want to take up this activity at a larger level, with the working capital or the equipment.

Lac is predominantly cultivated by economically weak tribal communities, often at the mercy of middlemen, or *paikars*, to sell their produce. Although the sector has very distinct systems, and people are engaged in different activities and function as buyers, processors and agents, it remains very unfriendly to the poor lac cultivator. The agents, or the middlemen, who buy the lac, hoodwink the farmer while weighing the produce. They also keep an unjustifiable margin between the buying price at the



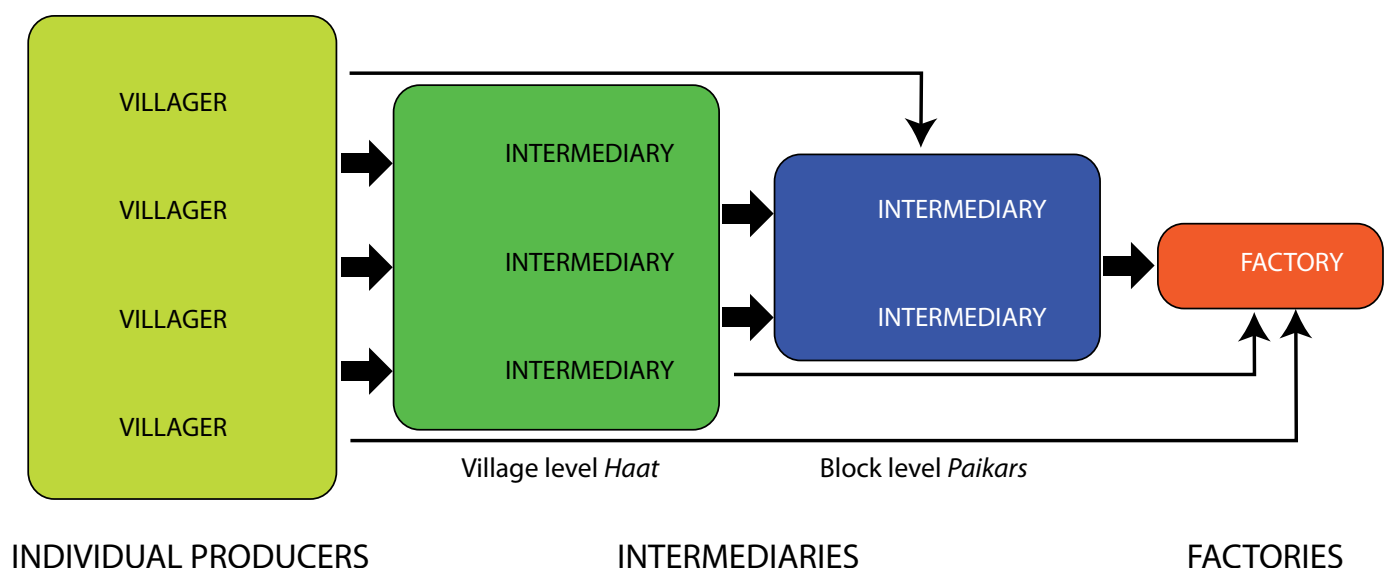
KEY CONSTRAINTS AT THE FARMERS' LEVEL

- Traditional cultivation practices with high production risks
- Lack of technical knowledge
- Lack of quality seed material (brood lac) for producers
- Lack of service provision (such as credit, insurance or inputs)
- Significant risks beyond human intervention (such as unpredictable weather)
- Exploitative relationship between markets and farmers

farmer level and the selling price at the processor level, making huge profits. These middlemen adulterate the raw lac by embedding it with mud, thereby lessening the resin content of the produce. The process is unfavourable both

to the cultivator, who doesn't get attractive returns for his produce, and to the end buyer, who gets adulterated lac.

EXISTING SUPPLY CHAIN





Pradan's Interventions



Rahil Tuti, a lac rearer from Setagarha village, owns about 50 host trees. She says with a heavy heart, "Even though we have a good number of host trees, in the past few years, we haven't got a good yield. I really want to understand the problems and reform our rearing practices."

Weighed down by the numerous risks and uncertainties of lac rearing, many farmers, like Rahil, of the region are almost giving up on lac.

Pradan's strategy is to empower the rural communities so that they are able to access opportunities for sustainable livelihoods. Looking at the great promise that the lac

I really want to understand the problems and reform our rearing practices.

- Rahil Tuti, Lac rearer

industry holds, despite its challenges, Pradan intervened in the sector for the first time, in 2001, with 25 families of Torpa block in Khunti District. A few years down the line, Pradan partners more than 2,600 families of Khunti, helping them towards generating a sustainable income.

YEAR	NO OF FAMILIES
2001–2002	25
2002–2003	303
2003–2004	743
2004–2005	864
2005–2006	1,212
2006–2007	1,914
2007–2008	2,659

Pradan's initial focus was on the various stages of lac rearing in order to reduce the uncertainty, increase productivity and help the poor families of Khunti use their natural resources and skills to the optimum level. The starting point of the intervention was the establishment of Women's Self-Help Groups (SHGs). Once the concept of an SHG gained acceptance by the villagers, the members started to look for opportunities to enhance their livelihoods. The traditional source of livelihood—lac rearing—proved ideal for Khunti and adjacent areas.

Key Elements of Lac Intervention by Pradan

The key elements of the lac intervention strategy by Pradan included:

- Collaborating with IINRG and practising the experiments done in the laboratories on the field, that is, from 'lab to land'.
- Promoting scientific rearing practices to reduce the mortality of lac insects
- Training the farmers in scientific rearing practices
- Building linkages for material and financial inputs (credit and insurance) with actors such as SHGs, banks and insurance companies
- Diversifying the host plants
- Making lac rearing a round-the-year activity by experimenting with different strains on different host plants, for example, Kusumi on *ber*
- Preparing a cadre of trained youths as Local Resource Persons (LRPs) for lac cultivation
- Assuring a supply of quality brood lac from brood surplus areas to brood deficit areas

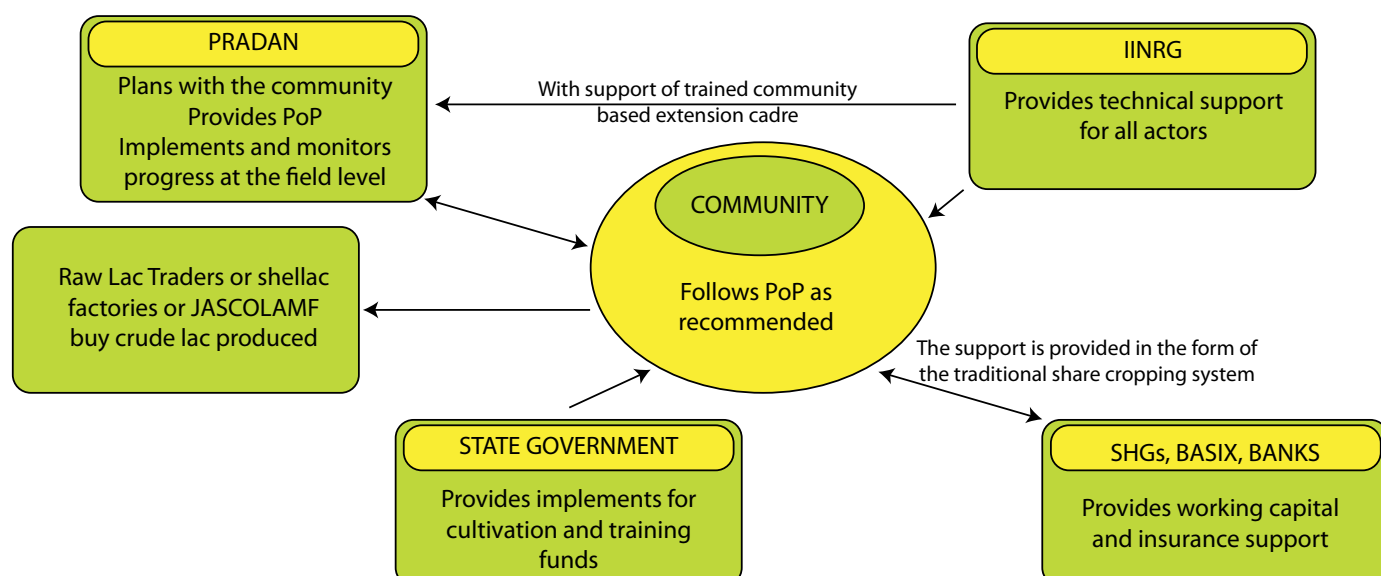
COLLABORATION IS THE KEYWORD

Intervention is a combination of appropriate technical inputs, provided by IINRG, Namkum, and grassroots mobilisation skills of Pradan. The project has been supported by Department of Welfare, Jharkhand. The lac programme has been scaled up through an innovative project developed by Pradan for the Jharkhand government. This project is funded by the Planning Commission of India and is being implemented by Pradan in association with other civil society organisations such as Nav Bharat Jagriti Kendra (NBJK), Karra Society for Rural Action (KSRA), Network for Enterprise Enhancement and Development Support (NEEDS) and WORLD VISION. The aim is to support 20,000 lac-rearing families of Jharkhand within a stipulated period of four years (2005-06 to 2009-10).

GRANTS AND FUNDS RECEIVED

Year	From	Amount in rupees	No. of families	Location
2003-04	IINRG & Dept. of Co-operation	5,00,000	300	Khunti
	Dept. of Co-operation	10,00,000	500	Khunti
2004-05	Dept. of Co-operation	8,00,000	400	Chaibasa Ghumla Khunti
2005-06	TWC, Dept. of Welfare	7,40,000	500	Khunti
2005-06 to 2009-10	Planning Commission of India	9.84 crores	20,000	Jharkhand
(to Pradan and other NGOs)			(Pradan's share is 5,000 families)	

COLLABORATIONS



Lac Rearing: Then and Now

When Pradan began working on promoting and offering a scientific package of practices and the benefits to the traditional lac rears, there were not many takers of the idea. The lac rears' unwillingness was the unpredictability and the fluctuation in lac production, leading to an uncertain and unassured income. The lack of availability of good quality brood was another area of concern. Interacting closely with rearing families, Pradan identified each and every step of concern, and looked for a solution.

To begin with, convincing the lac rears to adopt new ways of lac cultivation was a mammoth task. There were deep-rooted misconceptions regarding lightning, fog and pollution that were difficult to overcome. Besides one-on-one communication and village-level group meetings, Pradan organised street plays to help villagers understand the benefits of scientific rearing.

Key Areas of Scientific Intervention	Identification of good host plants
	Improved pruning techniques for greater canopy
	Nylon net-bags techniques to prevent brood-borne predators
	Superior practices for brood inoculation
	Rotation of net bags
	Practice of removing <i>phunki</i>
	Spraying of insecticides and fungicides in a regulated schedule
	Follow-up on male insect emergence, predator attacks, proper growth, etc.
	Proper time for harvest and related techniques

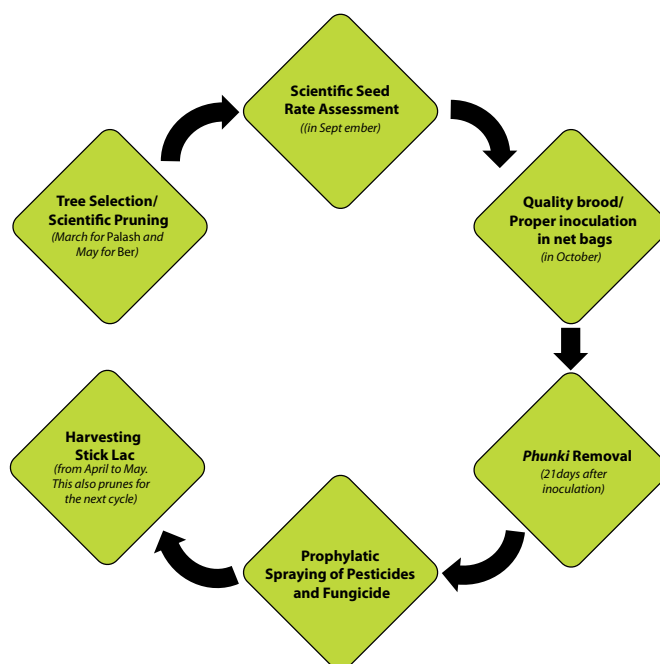
One such street play was attended by Sushila Tuti. Sushila says, "We were just not ready to accept the fact that anything beyond what we had already done for generations could be of any help. How could spraying pesticides decrease lac mortality? For generations, we had been told that one should remain on an empty stomach till the inoculation of the host trees or else lightning would blind the lac insects! Then, we saw this street play in our hamlet, which opened our eyes to so many things. Now I don't believe in rumours and follow the rearing methods taught to us by Pradan professionals and am extremely happy with the results. When I have a doubt, I at least know where to clarify it."



Cecilia Tuti, a lac rearer from Gutwa village, says, "Although we have always reared lac, we saved no money from it. We could barely feed our family for six months through the paddy we cultivated. Today, my income from lac enables me to live a life of dignity. I earned Rs 24,000 from lac last year, and now dream of building a house for myself."

Like Cecilia, many other lac rears have been beneficiaries of Pradan's intervention in the lac sector. Lac rears were provided support and guidance at every step. To begin with, Pradan organised a one-day hamlet level training conducted by IINRG experts on the scientific package of practices (PoP) for all producer families. The training was then carried forward by Pradan professionals through on-the-job training, in which lac rears were helped at each and every step of the scientific practices to be followed during a crop cycle.

TECHNICAL INTERVENTION POINTS



Learning the Ropes



TREE SELECTION AND PRUNING

Scientific lac cultivation begins with identification of good host plants, which should preferably be young with a lush canopy and be near a water source or lowland. The next step is pruning, in which the shoots of host trees are chopped off to ensure the growth of healthy and succulent shoots. Scientific pruning ensures the availability of a large number of shoots for the insects to settle. A sharp *dauli*, or secateur, is used for effective pruning so that branches are cut with a downward slant, allowing the rainwater to pass over it easily. *Palash* and *ber* are pruned six months before inoculation whereas *kusum* is pruned eighteen months before inoculation. After the identification of host trees, a scientific estimation of the host trees is conducted to figure out the rearing capacity of a tree.

BROOD INOCULATION

The next step is to procure good quality brood. Brood, or seed, lac is the most crucial input in the lac production. The brood lac lives only for a couple of days; hence, it cannot be stored. The brood is then inoculated in nylon net bags. At the time of packing, some of the predators remain inside the brood and the packing. They bore minuscule tunnels inside the lac encrustations and live there and also procreate. The

net bag, which is the first level of screening for predators, has very small holes, just about large enough to allow the lac insect to come out and trap the predators, which are bigger in size, inside. The predators cannot prey on the lac insects, which have, by then, settled on the tree. Pradan has trained the members of its SHGs to cut the twigs on which the brood encrustations are formed and pack the brood in nylon net bags. To check the quality of the brood, a Brood Centre was introduced in the year 2005. Each Brood Centre caters to the needs of 50 lac rearers and is used as a Brood Cutting and Packing Centre.

Pradan also realised that the rearers earlier did not give much thought to how the brood would be inoculated. More often than not, rearers would simply mount the brood over the trees haphazardly.

Virginia Barayut of Dulli village of Khunti understands the need for inoculation very well. She explains, "Packing the brood in nylon net bags is the first step to ensuring that lac insects swarming out of the mother cells will be protected from predators. We have now been trained in the specific ways of tying the brood. For instance, we use one 100 gm net bag pack for every 5 m long shoot. This gives us an estimation of how much brood has been inoculated and helps us to calculate the conversion rate for each cycle. This also means not a single inch of brood is wasted. As for our returns, I can confidently claim that this new technology has doubled our profits." The net bags are rotated on the host trees for the uniform settlement of the larvae.



The nylon net technology

REMOVING PHUNKI

Phunki is the remainder brood lac in the nets after the larvae insects have emerged on to the twigs/plants. Since this may contain pathogens/predators, it is advisable to remove it from the host tree after about 21 days. Phunki also contains lac resin and can fetch returns equivalent to one-fourth of the brood cost.



SPRAYING INSECTICIDES

During the initial phase of growth, a very important precautionary measure to reduce mortality is the spraying of pesticides. Timely spraying of pesticides saves up to 80% of the crop from insects, fungus and bad weather. The trees are sprayed for the first time with insecticide 35 days after the application of brood lac and, thereafter, on the 10th day after removal of the *phunki*. The second spraying is done 50–55 days after application of the brood lac. The third and fourth sprayings, known as the SOS sprayings, gets done in the winters, only if the weather remains foggy. Whereas both insecticides and fungicides are used in the first two sprayings, only fungicides are used in the SOS sprayings.

Phoolmani Tuti follows each and every step of these technical directions very carefully. And she explains why. “A tree which would give us 10 kg of lac a few years ago gives us nothing less than 25-30 kg today. Just a little effort in packing the brood in net bags, removing the *phunki* and spraying pesticides has given us such great results! And what I like the best about the scientific package of practices is that we, as women, are more involved in the rearing process now. We receive training in our group meetings, take loans from our SHGs, and feel empowered by the fact that there is this whole set of people to fall back on in times of crises,” says Phoolmani with a smile on her face.

LIST OF INSECTICIDE/FUNGICIDE

RANGEENI STRAIN	INSECTICIDE Endosulfan 35 EC (for example, Thiodan) to control Eublemma amabilis and Pseudohypatopa pulverea; Dichlorvos 76 EC (for example, Nuvan) to control Chrysopa spp.	FUNGICIDE Carbendazim 50% WP (for example, Bengard)
	INSECTICIDE Endosulfan 35 EC (for example, Thiodan) to control Eublemma amabilis and Pseudohypatopa pulverea; Dichlorvos 76 EC (for example, Nuvan) to control Chrysopa spp.	FUNGICIDE Carbendazim 50% WP (for example, Bengard).



Credit and Insurance

Following the scientific package of practices demands investments; and this is where the SHGs promoted by Pradan come to the lac rearers' rescue. Sushma Runda of Barodih village cannot stop thanking her SHG, which has always been a friend in need for her, even when she had to handle domestic crises such as illness. The SHG came forward to help her yet again when Sushma needed money to buy brood. She says, "I wouldn't have invested in lac if it were not for my SHG. Peer support and credit helped me put in all my energies in lac, and look at the results! I took a loan of Rs 600 to buy 10 kg brood last year, which was inoculated on three ber trees. Nine months later, after clearing off my loan, I had a saving of Rs 2,000." Many such stories are being replicated around savings and credits supported by the SHGs, linked to banks and other financial institutions such as insurance companies for assistance.

Lac production depends on weather conditions and any change in the optimal climatic conditions can significantly reduce yield. To cope with weather-related risks, Pradan has facilitated Weather Based Insurance Schemes, in association with BASIX. The insurance scheme, implemented by ICICI-Lombard, works as an effective instrument in stabilising the revenue of the lac rearers when weather hits them hard. Under this

scheme, lac rearers are insured against perils caused by abnormally low and high temperatures/rainfall and excessive variation of temperature.

The claim settlement is a hassle-free process because the beneficiary is not required to file a claim for loss to receive a payout. Instead ICICI Lombard compensates the beneficiary at the end of the crop season for any deviations from the normal conditions, on the basis of the temperature and rainfall data collected from the third-party agencies. Once verified by the insurer, the claim settlement is done within 30 days of data released.



Brooding Over the Brood

Most of the people have given up the lac sector altogether because of the lack of accessibility of quality brood lac. Bilasi Tuti of Setagarha village in Khunti validates this point. Although lac rearing has been a family occupation for generations, her husband Suleman Tuti and she were almost determined to give it up. Bilasi says, "Growing lac looked like the most difficult option for us at one point of time. To begin with, if the weather didn't favour us, we wouldn't even get brood in our hamlet. Buying brood from anywhere else would cost us lots of money and time. For example, in 2003, there was no brood available in Khunti because of bad climate. Now buying brood for 10 trees from other places such as Simdega would mean an investment of more than Rs 3,000, excluding our travel costs. Moreover, one would not even be sure of the quality. I didn't want to invest in such an expensive activity, which probably wouldn't yield a definite result."

Pradan realised that there was one way of helping Bilasi and many other lac rearers like her—the supply of quality brood had to be made stable. This would help stabilise lac production. While intervening in the brood sector, Pradan followed a two-pronged strategy. First, it made the brood available in the brood-deficit areas by buying it from the brood-surplus areas and giving it to the rearer at a nominal price compared to the market rates. This was done through the producers' institutions, promoted for facilitating such economic activity. Bilasi now buys brood through her SHG. Last year, she bought 10 kg of brood for Rs 600 and was very happy with the quality of the brood.

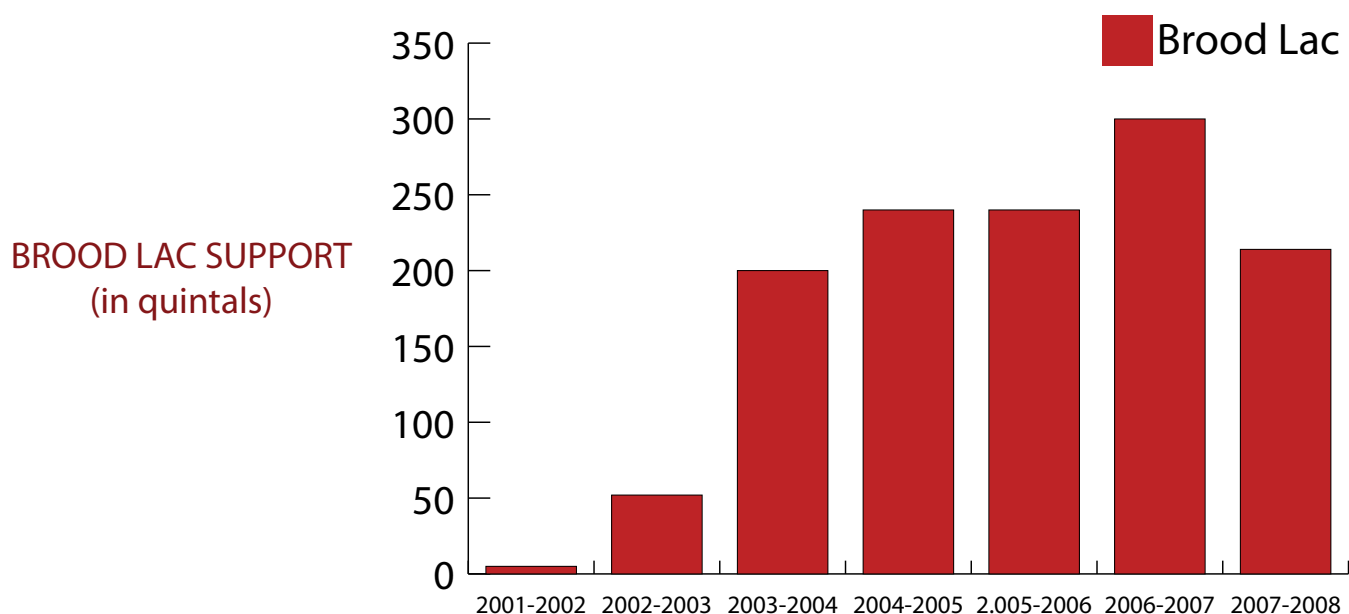
Another strategy was to encourage farmers to produce their own brood so that they do not have to depend on the highly uncertain supply of brood in the market. Brood is most often grown on *palash*, which can be found in abundance in the jungles of Jharkhand. With IINRG's guidance, Pradan has helped farmers preserve brood on the *ber* trees in a coupe system.

What is the Coupe System?

Because of its lush canopy, a *ber* tree has multiple pruning points. Usually, lac encrustation is very low on the upper part of the canopy. The Rangeeni crop begins to mature in the month of May and the hatching of eggs takes place in the month of June–July. If some part of the crop is left for the next two months, the same crop will convert into brood. In a coupe system, some of the branches, which bear less lac encrustations, are left as these are whereas the rest of the tree is pruned for the next crop. From these leftover branches, tiny insects emerge in the month of June–July, and are used as brood.

To grapple with the brood crisis, Pradan is concentrating on making lac a round-the-year activity. The three models of lac rearing that Pradan follows in its interventions are:

- Rangeeni on conventional hosts such as *ber* and *palash*
- Kusumi on conventional hosts such as *kusum* and *ber*
- Kusumi on shrub hosts such as *semialata*





A healthy lac crop

LAC REARING ECONOMICS

Model No.	Lac Prototype Name	Profits from One Learning Unit	Profit Potential from One Business Unit per annum	Working Capital for One Unit (Rs)	Equipment for One Unit (in Rs) of Five Rearers	Net Return to Labour (Rs)
1	Rangeeni lac on conventional hosts (ber/palash)	1,800	5,400	890	9,000	165
2	Kusumi lac on conventional hosts (kusum/ber)	2,500	7,500	2,240	9,000	230
3	Kusumi lac on shrub hosts (<i>semialata</i> under irrigated conditions)	16,000	16,000	3,830	11,932	545

Rangeeni on Conventional Hosts

Since the beginning of its intervention, Pradan had been promoting cultivation of the Rangeeni strain. It has a smaller crop cycle than Kusumi. On an average,

the Rangeeni strain takes about six months to get ready whereas the Kusumi could take as much as 18 months from pruning to inoculation.

ECONOMICS OF RANGEENI LAC

INPUTS

Items	Unit	Quantity	Rate	Total (Rs)
Brood lac 15 kg	Brood	15.00	30.00	450.00
Pesticides 4 sprays for 7 trees @ Rs 5 per tree (Rs 35)	Sprays	4.00	35.00	140.00
Nylon Net bags @ Rs.2/bag runs for min 3 cycles (Rs 0.67)	Net bags	150.00	0.67	101.00
				691.00

OUTPUTS

Items	Unit	Quantity	Rate	Total
Phunki Lac	Lac	3.00	55.00	165.00
Scrapped Lac (2 times of brood)	Lac	37.50	55.00	2,062.50
				2,227.50

PROFITS

Rounded to	1,537.00
Return to labour (Per day)	153.70

Kusumi on conventional hosts

To make lac rearing a round-the-year activity, by 2006, farmers were persuaded to take up lac rearing on *kusum* and *ber* hosts. In comparison to the prevailing Rangeeni strain, for which the average conversion rate of brood to scrapped lac was about 1 : 2.5, the conversion rate for Kusumi was almost double at 1 : 4. Today, there are about 750 farmers, who have taken up cultivation of the Kusumi strain on *ber*.

Working in tandem with the scientists in the laboratories of IINRG and with the farmers in the field,

Pradan identified the benefits of cultivating the Kusumi strain on the *ber* tree. An on-farm trial began with 54 lac rearers in 2006, and the result was overwhelming. The average conversion rate was as high as eight times the amount of brood that was inoculated! This has opened a new door of opportunity for the thousands of tribal lac rearers of the region. They are more than willing to follow their fellow villagers, and today, about 1,500 lac rearers have taken up lac farming on the *ber* trees.



Kusumi on ber

ECONOMICS OF KUSUMI LAC

INPUTS

Items	Unit	Quantity	Rate	Total (Rs)
Brood lac 15 kg	Brood	15.00	50.00	750.00
Pesticides 4 sprayings for 7 trees @ Rs 5 per tree (Rs 35)	Sprayings	4.00	35.00	140.00
Nylon net bags @ Rs 2/bag runs for min 3 cycles (Rs 0.67)	Net bags	150.00	0.67	101.50
				990.50

OUTPUTS

Items	Unit	Quantity	Rate	Total
Phunki lac	Lac	3.00	85.00	255.00
Scrapped lac (2.5 times of brood)	Lac	45.00	85.00	3,825.00
				4,080.00

PROFITS

Rounded to	3,090.00
	3,000.00
Return to labour (Per day)	309.00

Semialata – Host Plant Diversification

Ber, palash and kusum are the three main host trees of lac. These host trees are spread across the jungles, sometimes away from the villages. Because of their size and the distance from the villages, rearers feel skeptical about inoculating on these trees. Sundar Pahan of Chitramu village has inherited more than 50 host trees of lac, but hasn't been able to inoculate on more than 8 to 10 trees in a crop cycle. "How will I look after them all at the same time?" he asks candidly. This was one of the reasons why Sundar was convinced about investing in a *semialata* plantation.

Of late, Rangeeni Lac on traditional host plants such as ber and palash has been unsuccessful due to repeated pestilence. To counter this development, Pradan has attempted a new experiment; that of trying Kusumi Lac on unconventional hosts such as *Flemingia Semialata*. This is not an unknown technique as it has been also tried out that the IINRG and has the potential of substantially reducing the risks to the farmer by diversifying the host plant base.

Flemingia Semialata is a host plant that can be grown in the farmstead, and can be inoculated after one year of plantation. The average height of the plant is about 7 feet and it grows like a shrub. With the option of intercropping, a *semialata* plantation can be well looked after and is easy to maintain.

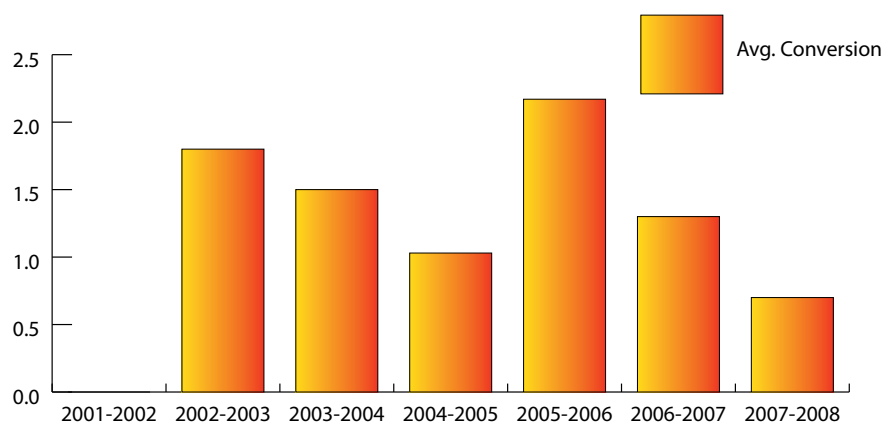
Pradan helped 20 progressive farmers like Sundar Pahan to plant *semialata* in 2006-2007 and, now, many more are willing to join the group. Sundar says, "It has only been a year since I planted *semialata* on my land. Besides keeping the brood for my own host trees, I managed to earn Rs 10,000 from 7 kg of brood inoculated during the last cycle. And all this only from planting *semialata* on just one-tenth of an acre of land! I am convinced this plantation will turn out to be the turning point in the way we have reared lac."

Asrita Horo, another lac rearer from Deogaon village, echoes similar sentiments. She has planted *semialata* on a small patch of her homestead, and is now helping other farmers of her village do the same. These lac rearers have realised that *semialata* will help stabilise lac production and make lac rearing a rewarding livelihood option for a large number of poor tribal families in Jharkhand. The successful harvesting of lac on *semialata* has been a significant breakthrough in the lac programme because it reduces rearing risk considerably, increases yield, shortens the gestation period, enhances the productivity of bare uplands and the income of the lac rearer with a smaller landholding.



Inoculation on Semialata

AVERAGE CONVERSION ACHIEVED



ECONOMICS OF KUSUMI LAC ON SEMIALATA

INPUTS (for 15 decimal land)

Items	Unit	Quantity	Rate	Total (Rs)
Brood lac 18kg (30g x 600 shrubs)	Brood	12.00	50.00	600.00
Pesticides 4 sprayings for 600 shrubs @Rs 0.12/shrub	Sprayings	4.00	72.00	288.00
Nylon Net bags @ Rs.1.5/bag runs for minimum 3 cycles (Rs.0.50/bag of 50gm)	Net bags	600.00	0.50	300.00
				1,188.00

OUTPUTS

Items	Unit	Quantity	Rate	Total
Phunki lac	Lac	4.00	85.00	340.00
Sold as scrapped lac harvest (4 times of brood inoculated)	Lac	72.00	120.00	5,100.00
				5,440.00

PROFITS

				4,252.00
Return to labour (Per day)				425.20

Mobilising the Community

Pradan strongly believes that the way to community's development lies in its own hands. Thus, to mobilise more and more villagers to take up lac rearing as a livelihood activity, Local Resource Persons (LRPs) and Brood Inspectors are chosen from within the community. These LRPs and Brood Inspectors are rearers themselves, with a flair for leading and helping others. The process of choosing these community leaders is a rigorous one. Young lac rearers, willing to take up the additional responsibility of guiding and training other fellow farmers, are selected, following a written test and interview. The idea is to make sure that the LRPs and Brood Inspectors not only take their responsibility very seriously, they also become the carriers of Pradan's belief that positive and sustainable change for the rural poor can begin only at the grassroots.



Learning to Dream Again



“We never gave any thought to the various steps that one followed during rearing.”

- Lakshi Devi, Lac rearer

in one of our SHG meetings with a Pradan professional, we had a discussion on scientific package of practices. I got interested in knowing more, and after that there has been no looking back,” Lakshmi says.



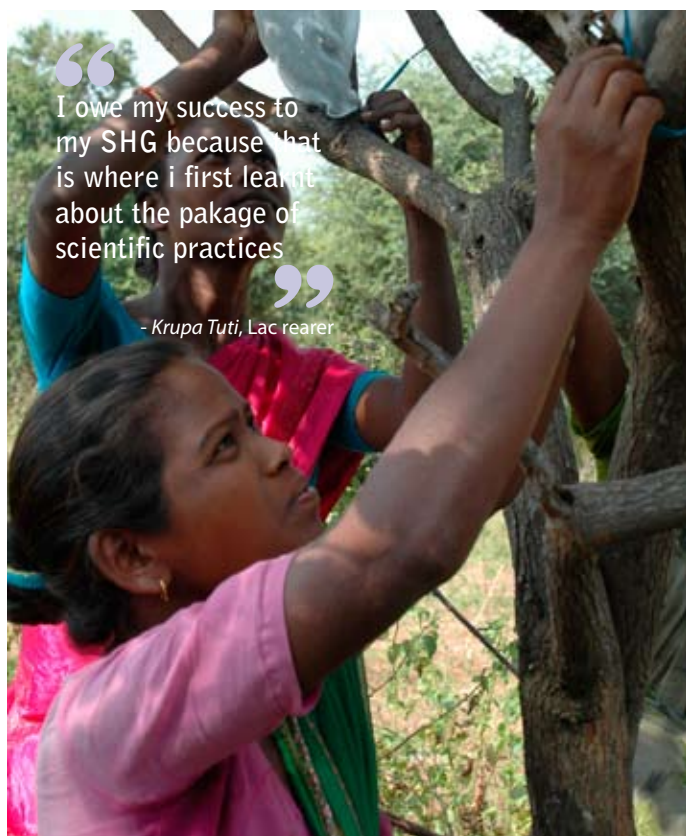
“My association with Pradan seemed to be the turning point of my life.”

- Phoolmani Devi, Lac rearer

Lakshmi Devi of Nichitpur Raidih village in Khunti district is a confident woman today. The secret of her confidence lies in the fact that she is a successful lac rearer with an annual income of Rs 32,000, of which Rs 14,000 came from lac. “I have around 50 trees of lac, but we never thought of them as an additional source of income. We reared lac more out of tradition and habit than anything else. We never gave any thought to the various steps that one follows during rearing. And then,

Even a hard day of labour hasn't taken away the smile from Phoolmani Devi's bright face. It has been a tough day indeed, with household chores and livestock to be taken care of. But she doesn't seem a bit tired in the evening while sitting down with her other neighbours for packing the brood in the net bags. All the bags have to be inoculated the day after, so women are busy cutting and packing the brood.

While doing her job swiftly, Phoolmani Devi says, “Being financially independent seemed like a distant dream two years ago. We may have reared lac for generations, but I wasn’t willing to invest time and energy on it after my husband passed away. But my association with Pradan seemed to be the turning point of my life.” Phoolmani Devi is the star lac rearer now, earning more than Rs 20,000 a year from lac. For a woman, who was struggling to feed her children at one point of time, this is no mean achievement!



Phoolmani’s neighbour, Krupa Tuti, voices similar sentiments. Krupa vouches for the scientific methods of lac cultivation for she has witnessed the change in her financial status in barely two years. Krupa says, “I owe my success to my SHG because that is where I first learnt about the package of scientific practices. At a time, when we didn’t have any money to buy brood, our SHG came to our rescue. With other members of my SHG, I learnt about the nuances of lac rearing and, at that time of crisis, it was there to support me.” Today, Krupa earns Rs 20,000 from lac and has cleared off all her loans taken from the SHG. She now plans to plant some more host trees of lac.

There are many such inspiring stories, which have stirred the interest of lac rearers living in the neighbouring areas of the project villages. The reduction of risks at various levels of rearing has made lac a robust livelihood option today for more than 2,000 tribal farmers. Improved

cultivation is now being done by farmers themselves with very little on-field guidance or input subsidy. Inspired by the profits made by lac rearers of Khunti district, the experienced Executives of Pradan from the Khunti team are now also assisting other lac projects in Bankura and Purulia (West Bengal) and East Singhbhum, Dumka, Godda and West Singhbhum (Jharkhand).

Pradan arranges for these LRPs to attend a week-long training programme in scientific package of practices at IINRG. These youth provide services such as knowledge dissemination and on-job training to other lac rearers.

Come October and Josephine Linda of Huduwa village suddenly becomes busy like never before. Apart from taking care of her katki crop of the Rangeeni cycle, which is ready for harvesting, Josephine has to help other lac rearers prepare for harvesting and inoculation for the next cycle. Josephine comes across as an extremely confident woman and her responsibilities range from making sure that the host trees in her region are pruned well, the brood is made available to the rearers and they inoculate it properly after packing it in the nylon net bags.

Josephine says, “I owe my confidence to my association with Pradan. I work towards two objectives now—one, to earn good returns from lac and to raise my family well, and, two, help many more lac rearers adopt scientific methods of rearing.”



Josephine was not the same confident young woman always. Five years ago, after graduating in Arts from Nirmala Women’s College, Ranchi, she did not want to migrate to a city and take up a regular job like her other peers. Lac rearing has been her family’s main source income for generations. But unpredictable harvests for the past few years worked as a deterrent to her following this ancestral livelihood. Many families in and around her village were giving up on lac altogether and were migrating to the cities in search of a more stable

source of income. Josephine would have followed suit if it were not for an interaction that she had with one of the Pradan professionals. This is when she realised what had gone wrong in the way they had been rearing lac. Josephine was more than keen to adopt the remedial measures, and within a few months she witnessed the outcome. Josephine recalls, "I had written down each and every step of scientific rearing. I just didn't want to go wrong. It was the first time I had inoculated Kusumi on a *ber* tree following Pradan's advice. The result was astounding. The very first experiment turned out to be a success and we could derive four times more lac than what was inoculated. That first income of Rs 2,500 gave me enough confidence to take up lac rearing very seriously all over again."

And this was just a beginning. Noticing her interest in training others, Pradan sent her for a week to IINRG. Since then, Josephine has been deeply involved in helping rearers understand the minute details of scientific lac rearing. From providing training in pruning,

brood cutting and packing to inoculating brood and harvesting through the right techniques, Josephine, like other fellow LRPs, is always there for the villagers every time they need some help. She has now become an enthusiastic advocate of scientific package of practices and travels frequently to other villages to train other lac rearers.

Some of the LRPs are Brood Inspectors, who have received intensive training in the brood selection process and brood estimation. They inspect the brood before the farmers inoculate their trees and hence, contribute to the quality and quantity of production. There are 62 LRPs working in the Khunti District now, of whom 20 work as Brood Inspectors. The LRPs and Brood Inspectors receive their remuneration, based on the services provided and activities undertaken. One LRP is supposed to look after 50 beneficiary families in five hamlets and can earn around Rs 8,000 during one crop cycle.





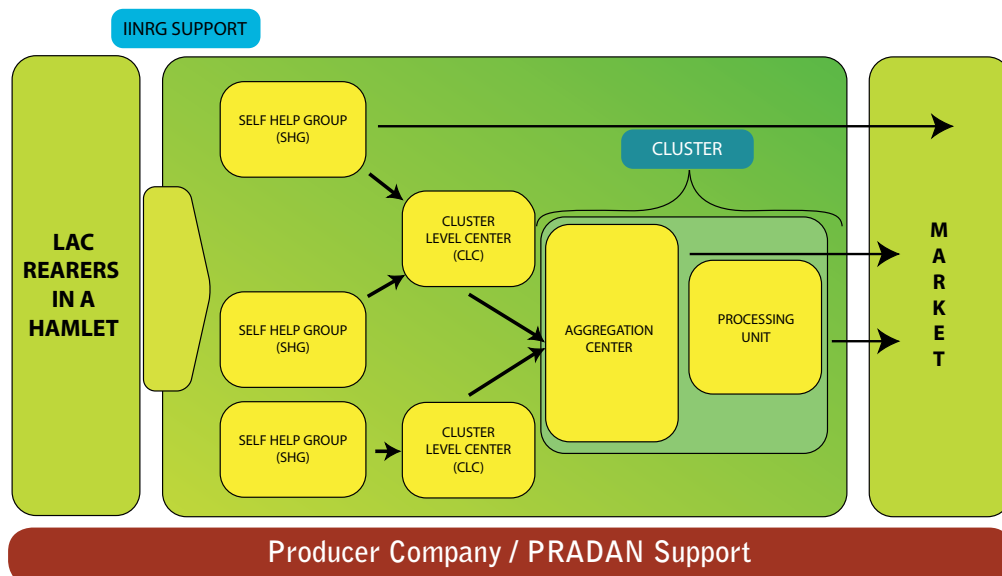
Looking Ahead

Enthusiased by the willingness of more and more farmers to carry out the scientific package of practices, Pradan is endeavouring to make the whole process more effective and infallible. Lac farmers do encounter factors that are beyond human control such as climate change or extreme weather conditions. To combat the problem, Pradan is experimenting with growing lac for the summer cycle inside agro-green net roofs in association with IINRG. Research is going on with experimentation on new host plants such as calliandra and pigeon pea, which are smaller in size and can be grown in rearers' homesteads. Significant production risks such as mysterious diseases, heat mortality, etc., are still not sorted out. These will need research.

The prices for lac are completely dependent on the external markets, and the fluctuations are beyond Pradan's control. In the past few years, the prices of crude

lac have plummeted, compelling farmers to give up lac rearing. Pradan is working to building lac growers' co-operative for creating and monitoring facilities for brood procurement, marketing, storing the produce and quality control. This co-operative will be used for training, information sharing and building linkages with access to external credit and marketing and processing facilities, and will also act as a system for insulation from price fluctuations.

THE NEW VALUE CHAIN TO CENTRALISE ROLE OF PRODUCERS



The organisation of lac cultivators into producers' co-operatives will bypass middlemen and help the farmers find good prices for their product. Such an organisation, with its trained cadre, will also provide sorting and grading services, thus leading to much more accurate and reasonable returns, based on the resin content of the product, for their labour and also ensuring a good quality buy for the procurers. To safeguard the interests of poor tribal lac rearers, Pradan is also trying to foster links between the farmers with agencies such as the Jharkhand State Cooperative Lac Marketing and Procurement Federation (JHASCOLAMPF) etc.

The co-operative will also house doorstep referral services through a trained and motivated team of LRPs, stock material, and provide the producers with inputs such as net bags, spraying machines, pruning knives and secateurs.

Once the target of stabilising lac production in the area is achieved, Pradan intends to intervene in the semi-processing dimension of this sector so that lac becomes a steady source of income for the rural families of Jharkhand. Encouraging lac rearers to take up semi-processing of lac at the village level would mean employment for thousands of lac rearers. To build the value chain right at the village level, lac rearers will have to be involved in processing and marketing stages.

The journey ahead may seem long, but there are many lac rearers willing to join the caravan. One of them is Sundar Pahan, who sums up the entire effort precisely. He says, "Being able to earn a decent living without migrating to the city, providing a meaningful life to my children and learning everything new about lac, which is my source of sustenance—that's what I aim for in life." And this lacquered dream is slowly and surely coming true...

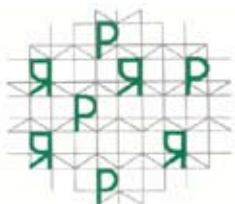






Lac rearing is one of the most preferred livelihood options for thousands of poor tribal families living in the forest fringe areas in Assam, Chattisgarh, Gujarat, Jharkhand, Madhya Pradesh, Orissa and West Bengal. Today, the gap between production and supply of lac stands at 10,000 MT worldwide, which can result into creating livelihoods for as many as one lakh families. PRADAN is currently working with 5,000 lac rearer families in Jharkhand to provide the families with a robust source of income by stabilising the lac production in the region. This is being done in collaboration with mainstream agencies like Jharkhand State Co-operative Lac Marketing Federation and Indian Institute of Natural Resins and Gums.

PRADAN is a voluntary organisation involved in promoting sustainable livelihoods for the rural poor currently operating in eight States, namely Assam, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Orissa, Rajasthan and West Bengal. It works with women from poor households, organising Self-Help Groups (SHGs) and promoting various farm, forest, livestock and village enterprise based livelihoods. Over 300 professionals of PRADAN presently work with 170,000 poor families, mostly from tribal and backward communities, facilitating positive and sustainable changes in their lives.



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