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Equipments for Manufacturing Lac Based Value Added Products

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ABSTRACT

Lac, a natural resin of insect origin, yields basically three useful materials *i.e.* resin, wax and dye and is an important source of livelihood for poor and tribal farmers in the lac growing regions. Lac growers harvest lac in form of lac stick and lac encrustations attached with sticks are then scraped which is known as sticklac. Sticklac contains impurities which need to be removed by converting sticklac in to seedlac through different unit operations under primary lac processing so that seedlac, a semi-refined product, can be further used in making lac based value added products *i.e.* shellac, button lac, bleached lac, aleuritic acid etc. Sticklac converted into seedlac can be stored like grain in jute/gunny bag or metal bin for longer period. Hence, lac grower can sell stored seedlac whenever they get remunerative price. Lac resin being natural, biodegradable and non-toxic, finds application in food, textile, furniture, electrical and pharmaceutical industries and provides immense employment opportunities. Regular demand for the materials derived from lac exists in the market due to global trend for use of natural products. Small scale lac processing unit can be established for conversion of sticklac in to seedlac in production catchment area at grower's level itself. Similarly, integrated small scale lac processing unit can also be utilized for conversion of sticklac in to seedlac with reduced man-power requirement and minimum drudgery. Equipments/machineries developed for manufacturing value added lac-based products may be encouraged in the country to reduce time of operation, drudgery and manpower requirement with enhanced capacity of value addition in lac and to promote entrepreneurship development which may further enhance employment generation. To ensure the quality of produce, traditional equipments/machineries needs replacement with new equipments/machineries made of food grade materials coupled with advanced automation system to the maximum possible extent. Value addition in lac could be promoted and migration of rural and tribal people to other states in search of employment could be minimized with adoption of improved equipment and machineries for value addition of lac at village level so that rural and tribal people may get remunerative price of their product. Hence, increase in sustainable livelihood of rural and tribal people might be possible with adoption of lac value addition sector.

Keywords: Seedlac, lac products, lac value addition, mechanization in value addition of lac

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INTRODUCTION

Forest and sub-forest dwellers mainly depend on agriculture and forest produce for their livelihood and lac is an important source of their income. Lac is nature's boon to mankind, and yields basically three useful materials *i.e.* resin, wax and dye. Lac is mainly produced in India, Thailand, Indonesia, part of China, Myanmar, Philippines, Vietnam, Cambodia etc. and India is the largest producer of lac in the world. In India, lac is mainly produced in Jharkhand, Chhattisgarh, Madhya Pradesh, West Bengal, Maharashtra, Odisha and part of Uttar Pradesh, Andhra Pradesh, Gujarat and NEH region.

Lac is a natural resin secreted by tiny lac insect *Kerria lacca* (Kerr.) which is generally used in our country for lac production (Sharma and Jaiswal, 2010). In India, lac growers rear lac insects on major commercial lac host trees *i.e. kusum* (*Schleichera oleosa*), *ber* (*Ziziphus mauritiana), palas* (*Butea monosperma*) and bushy plant *Flemingia semialata*, *Ficus spp. etc.* as the lac insect thrives best on the tender twigs of these major commercial lac host trees/plants. Rearing of lac insects on host trees is known as lac cultivation. Lac growers harvest matured lac from host trees in the form of lac bearing twigs which is commonly known as lac stick. Lac encrustations attached with lac bearing twigs (lac stick) are then scraped manually to separate lac encrustations from sticks of host trees. After scraping lac encrustations from sticks of host trees, it is known as sticklac which is sold by lac growers either in the local market to merchants or to representatives of lac processing industries where it is processed in to seedlac for its further use in making value added lac-based products *i.e.* bleached lac, aleuritic acid, shellac, button lac. Lac is a highly remunerative crop, paying high economic returns to the farmers and also to foreign exchange of the country through its export. Lac production in India was about 18,944 tonnes during year 2019-20 and India exported 7293.47 tonnes of lac in different forms and earned foreign exchange of Rs. 405.51 crores during year 2019-20 (Yogi *et al.*, 2021). Lac resin being natural, biodegradable and non-toxic, finds application in food, textiles and pharmaceutical industries in addition to surface – coating, electrical and other fields and provides immense employment opportunities. A definite demand already exists for the materials derived from lac, besides a tremendous

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potential for much higher consumption, due to global trend for safer natural products. The paper discusses mechanization status in manufacturing value added lac-based products and scope for entrepreneurship development through adoption of this sector.

MATERIALS AND METHODS

Lac harvesting

Lac was harvested from trees, which was in the form of lac stick. It was scraped manually to separate lac incrustation from lac stick and then sent to factories in form of sticklac. It was processed into semi-refined product 'seedlac' for its further use in making lac based value-added products *i.e.* shellac, button lac, bleached lac etc.

Seedlac processing

Seedlac making process from sticklac is very laborious, time consuming with higher manpower requirement for removal of impurities such as sand, dirt, stick, fine wood particles and lac dye associated with scrapped lac encrustations. A small-scale lac processing unit having capacity 100 kg sticklac per day was developed by ICAR – Indian Institute of Natural Resins and Gums, Ranchi so that lac growers can get the remunerative price of their produce. Similarly, to reduce man power requirement considering labour availability problem, reduce cost of primary processing, time and drudgery, an integrated small scale lac processing unit of the same capacity was developed by the institute. Shellac is the purest form prepared from seedlac through hot filtration process. Seedlac is converted into shellac either through *bhatta* process or utilizing steam heated filter press and sheeting roller for commercial production at the industrial level. *The Bhatta* process is an indigenous technique of shellac or button lac conversion from seedlac and practiced since ancient times. To mechanize shellac manufacturing from seedlac for commercial production, a steam heated hydraulic press and sheeting rollers are in use which were developed earlier during the british period. To mechanize the process of bleached lac and aleuritic acid manufacturing from seedlac for training and demonstration, pilot plant for bleached lac (capacity – 40 kg/batch) and aleuritic acid (capacity – 2 kg/batch) was developed during the year 2008 – 09. Similarly, a pilot plant for the preparation of technical grade lac dye from wash water obtained during lac washing operation under primary lac processing was also developed by researchers at the same institute during the year 2008 – 09. Equipment used for manufacturing lac-based value-added products discussed in the respective sections in detail as under.

Sticklac Processing

After maturation of lac crop on twigs of host trees (Fig. 1), the twigs of host trees along with lac encrustations were harvested (Fig. 2) manually using especially devised hand tool known as *Dauli*. These harvested lac bearing twigs are known as lac stick which is scraped manually to separate lac encrustations from lac stick. After separation of matured lac encrustations from lac stick it is commercially known as sticklac (Fig. 3) which mainly contains three useful products *i.e.* resin, dye and wax. Apart from these useful products, sticklac contains impurities in the form of woody materials, stone, sand, insect debris etc. and water-soluble lac dye which is a by – product of the lac industries. If sticklac is stored in bags, it forms lump which is difficult to crush during seedlac manufacturing from sticklc through different unit operations under primary lac processing. Further lump formation leads to deterioration in quality of lac and proper storage of sticklac requires large space with adequate ventilation. Lack of knowledge for proper storage, lack of storage facilities and need of immediate cash compels lac growers to sell their produce in form of sticklac (scraped lac) or cut bits immediately after harvest at prevailing price in the market which is sometimes very low. Sticklac or cut bits can be converted in to seedlac (semi refined product) through primary processing of lac and can be stored like grains in jute/gunny bags or metal bins for longer duration without much affecting quality of lac.

RESULTS AND DISCUSSION

Value addition in lac and lac-based products

Basically, conversion of sticklac in to seedlac through different unit operation under primary processing of lac is first step while manufacturing of lac-based products *i.e.* shellac, button lac, bleached lac, aleuritic acid and recovery of lac dye from wash water obtained during primary processing of lac are considered under value added lac based products. The equipments/machineries for value addition and manufacturing value added lac-based products are detailed below in respective sections.

Mechanization in seedlac manufacturing

Seedlac: Removing the woody materials, stones, sand, insect debris etc. as far as possible by crushing, sieving and winnowing and washing out the dye with water, yields the semi-refined product known as seedlac. Generally, seedlac is in the form of grain of 10 mesh or smaller and yellow or reddish brown in color depending on the host tree and the place from which the sticklac has been collected. Sticklac is converted in to seedlac through five major unit operations *i.e.* crushing, sieving, washing, winnowing and grading involved under primary processing. To convert the sticklac in to seedlac, initially sticklac is crushed to break the lac cell and expose it for removing impurities. After crushing operation, crushed lac is graded to make it up to desired size and washed in presence of water till removal of color of wash water. Washed lac is than dried in sun or shed in thin layer on cemented courtyard and time to time racking is done using wooden rack till complete removal of moisture from washed lac. After drying washed lac, it is winnowed to remove the lighter particles of impurities left in the washed and dried lac and graded to make the lac grain of uniform mesh size. Lac grains obtained after grading is known as seedlac (Fig. 4) which is the base material for preparation of lac-based value-added products *i.e.* shellac, button lac, bleahed lac and aleuritic acid etc.

To make seedlac from sticklac through primary processing, mainly three types of machineries *i.e.* commercial lac processing unit, small scale lac processing unit and integrated small scale lac processing unit have been developed by previous researchers. Details of the developed units (Table 1) based on capacity, method of operations and integration of different unit operations under primary lac processing in a single unit are as under.

Commercial lac processing unit

In commercial lac processing industries, out of different unit operations involved in seedlac making, crushing, washing and grading is done using large capacity crusher, washing machine and grader, respectively (Fig. 5 to 7) which is of about

750 – 1000 kg/day capacity for commercial production. Unit operations like drying, cleaning and final grading are done manually.

Small scale lac processing unit

The above-mentioned commercial scale equipments *i.e.* crusher, washer and grader for conversion of sticklac to seedlac through different unit operations under primary processing of lac are of high capacity and cost. As the commercial scale equipments under primary processing of lac are of high cost, the lac growers are unable to purchase the same due to their less purchasing capacity. Hence, to promote conversion of seedlac from sticklac by lac growers itself at village level, a Small Scale Lac Processing Unit (Fig. 8) having processing capacity 100 kg sticklac/day comprise of a set of four separate machines *i.e.* lac crusher, lac washing machine, lac winnower and lac grader were developed by researchers from ICAR – Indian Institute of Natural Resins and Gums, Ranchi to carry out the unit operations involved in primary lac processing and reducing the drudgery of manpower involved in primary processing of lac at village level. The developed unit can be driven manually or with electric motor and is user friendly. If processing unit remains functional for six months in a year, about 750 man-days of employment can be generated by establishing such unit and net profit of about Rs. 25,000/- per month can be earned.

Sticklac can be converted in form of seedlac through primary processing at village level using small scale lac processing unit and can be stored like grains in jute bags or bin for longer duration without affecting the quality of lac. The stored seedlac can be sold to earn remunerative price. Developed unit can be used for development of village level entrepreneurship for primary lac processing. Though small-scale lac processing unit is working well, however need was felt to develop integrated small scale lac processing unit to reduce man power requirement considering labour availability problem and reduce cost of primary processing. Considering above points, an Integrated Small Scale Lac Processing Unit (Capacity – 100 kg sticklc/day) was developed at ICAR – Indian Institute of Natural Resins and Gums, Ranchi to reduce manpower requirement, time and drudgery of the person involved in primary lac processing.

Integrated small scale lac processing unit

An integrated small scale lac processing unit, developed consisted of five major units *i.e.* sticklac handling unit, size reduction unit, grading unit, soaking unit and washing unit with tilting mechanism (Fig. 9). Different mechanisms provided in the unit (sticklac handling mechanism, crushing unit, grading unit, crushed sticklac handling unit, soaking unit and washing unit) worked as per requirement for different unit operations of seedlac manufacturing under primary lac processing. Bucket elevator was provided in the unit for easy transfer of raw materials in the different units for quick material transfer and minimizing labour requirement. The unit had washing barrel with tilting mechanism for batch washing of crushed sticklac and easy removal of wash water and prepared seedlac. The unit is suitable for up-scaled production of seedlac from sticklac with reduced manpower requirement compared to small scale lac processing unit. Developed integrated small scale lac processing unit is an automatic machine (except manual feeding of sticklac in to the feeding hopper) which reduces drudgery of the person involved in operation of the unit for conversion of sticklac to

Table 1: Details of manufacturing lac-based value-added products

Sl. No.	Parameters	Commercial lac processing unit	Small scale lac processing unit	Integrated small scale lac processing unit	Shellac manufacturing		Bleached lac plant	Aleuritic acid plant	Lac dye plant
					Bhatta process	Machine process			
1.	Raw materials	Sticklac	Sticklac	Sticklac	Seedlac	Seedlac	Seedlac	Seedlac	Wash water
2.	Capacity (kg/day)	750 – 1000 (Sticklac)	100 (Sticklac)	100 (Sticklac)	40 (Seedlac)	As per requirement	50 (Seedlac)	16.5 – 14.5 (Seedlac)	400 liter (Wash water)
3.	Finished product	Seedlac	Seedlac	Seedlac	Shellac	Shellac	Bleached lac	Aleuritic acid	Lac dye
4.	Finished product by weight of raw materials	55 – 85%**	55 – 85%**	55 – 85%**	87.5 – 92.5%#	90.0 – 95.0%#	80 – 82%#	12 – 14%#	0.025%##
5.	Power source	Electric motor	Electric motor	Electric motor	Manual	Hydraulic and electric motor	Electric motor	Electric motor	Electric motor
6.	Employment generation (man-days/year)*	Depends on persons engaged/day	750 (5 person/ day)	300 (2 person/ day)	450 (3 person/ day)	Depends on persons engaged/ day	Depends on persons engaged/ day	Depends on persons engaged/ day	Depends on persons engaged/ day

* if processing unit remains functional for six months in a year, ** depends on washing type, # depends on seedlac type and ## based on soluble dye quantity present in wash water

seedlac through primary processing. Yield and quality parameters of seedlac prepared from sticklac through developed integrated small scale lac processing unit was closer to the yield of seedlac manufactured using small scale lac processing unit and quality parameters were in accordance with the specification IS: 6921 – 1973 (Sharma *et al.*, 2020). An employment of about 300 man-days can be generated in a year if the unit remains functional for six months in a year.

Mechanization in shellac manufacturing

Shellac: Shellac is purest form of lac prepared from seedlac through hot filtration technique/process. Seedlac converted from sticklac through primary processing of lac contains impurities ranging from 2-7 percent based on type of washing. These embedded impurities are removed while converting seedlac into shellac during hot filtration. Seedlac is converted in to shellac either through handmade (*Bhatta*) process in small quantity at cottage level or utilizing steam heated filter press and sheeting roller for commercial production of shellac at industrial level. Shellac converted from seedlac utilizing traditional method of hot filtration (*Bhatta* process) is known as handmade shellac (Fig. 10) while shellac prepared from seedlac through steam heated filter press and sheeting roller machine is known as machine made shellac (Fig. 11).

Bhatta process of handmade shellac manufacturing

Bhatta process of shellac manufacturing is an indigenous technique of handmade shellac conversion from seedlac through which both shellac flakes and button lac are manufactured at cottage level industry. Whole process of handmade shellac manufacturing from seedlac through *bhatta* process (indigenous technique) is carried out by a team of three skilled manpower. To manufacture handmade shellac from seedlac, an amount of about 40 kg seedlac is filled in a markeen cloth having length 40.0 ft with 2.0 inch diameter. Seedlac filled in the markeen is processed in front of charcoal fired earthen oven (*bhatta*) by manually rotating the markeen cloth slowly from one end so that seedlac filled inside the markeen cloth moves towards *bhatta* by squeezing action. Another end of markeen cloth filled with seedlac is held in one hand by main person seated a side in front of charcoal fired *bhatta.* As soon as seedlac filled inside of the markeen cloth comes closer to high temperature of charcoal fired *bhatta*, seedlac melts and molten lac comes out from the markeen cloth through squeezing action generated by rotation of markeen cloth. The molten lac comes out from the markeen cloth is thoroughly mixed on the outer surface of markeen cloth to make the molten lac of uniform quality (Fig. 12) and then transferred on the outer surface of porcelain cylinder filled with hot water for flattening of molten mass of lac and subsequent operation of manual stretching (Fig. 13) and sheeting. After stretching and sheeting, the tenuous transparent sheet is laid flat away from charcoal fired *bhatta* to cool and then broken manually in to flakes of shellac (Fig. 10). Similarly, button lac is produced manually through *bhatta* process by making molten mass less viscous during thoroughly mixing of molten lac on outer surface of cloth bag made of markeen and then dropping the molten mass of lac on galvanized iron (GI) sheet (Fig. 14 and 15). A team of three workers produces 35 - 37 kg shellac or button lac in a day of eight working hours (Pandey *et al.*, 2016).

Shellac manufactured from seedlac for commercial production utilizing steam heated hydraulic press (Fig. 16) and sheeting rollers is known as machine made shellac. There are two types of machine-made shellac namely shellac manufactured through heat process with seedlac as raw material and shellac manufactured by solvent process with either sticklac or seedlac or kiri (a by-product of lac industry) as the raw material (Pandey *et al.*, 2016). Shellac prepared through solvent process are dewaxed shellac, dewaxed decolourised lac, garnet lac etc. To mechanize the shellac manufacturing through heat process, required quantity of seedlac is poured on the filter cloth placed inside of the steam heated hydraulic press having steam heated grids so that seedlac poured inside the steam heated hydraulic press melts under high pressure generated through hydraulically operated up-stroke pressing ram and filtered lac coming out from the bottom portion of steam heated filter press collected in trays. Molten mass of lac collected in trays are then transferred to the steam heated collection pan from where it is again transferred on the sheeting/flaking rollers (Fig. 17) to convert molten lac in form of thin sheet of uniform thickness. The molten lac squeezed out from the sheeting rollers is stretched either manually by hand or mechanically on a conveyer. The sheet of uniform thickness when comes in contact of environment, it becomes hard which is then manually broken in flakes form.

Mechanization in bleached lac manufacturing

Bleached lac: Sticklac contains two coloring agents *i.e.* laccaic acid - a water soluble dye and erythrolaccin – dye soluble in alcohol/spirit but insoluble in water. Water soluble dye is more or less completely removed during washing operation of sticklac in presence of water under primary processing operation for conversion of seedlac from sticklac. Color of refined lac *i.e.* seedlac, shellac and button lac ranges from pale yellow to deep orange brown, almost entirely due to erythrolaccin. Pale yellow colored product manufactured from seedlac by elimination of erythrolaccin through chemical process is known as bleached lac (Fig. 18). Generally, two kinds of bleached lac namely regular and refined are manufactured commercially. Out of these, regular bleached lac contains wax while refined bleached lac is wax free which is removed during the process of its manufacturing. Refined bleached lac is commercially known as dewaxed bleached lac. These bleached lacs (regular and refined) are commercially available in three forms namely wet, surface dried (air dried) and bone dry (Pandey *et al.*, 2016).

Manufacturing of bleached lac

To manufacture bleached lac from seedlac, grains of seedlac are dissolved in hot alkaline water and straining the liquid for further bleaching by bleaching solution. Bleached solution is then dewaxed for removal of wax to prepare dewaxed bleached lac and precipitated with mineral acid, filtered, washed and dried for further packaging and storage. Bleached lac is commercially manufactured in two forms *i.e.* solid form (*Hank*) and powder. Bleached lac in powder form is directly obtained through drying the precipitated and washed bleached lac while bleached lac in solid form (*Hank*) prepared by melting the washed bleached lac in hot water and pouring the same in mould of desired size and shape (Pandey *et al.*, 2016). Bleached lac is produced and marketed in both forms namely powder and solid form. However, solid (*Hank*) form of bleached lac is generally used for domestic purpose such as polishing of wooden items whereas powder form of bleached

Fig. 1 Lac crop

Fig. 2 Lac stick

Fig. 3 Sticklac

Fig. 4 Seedlac

Fig. 5 Lac crusher

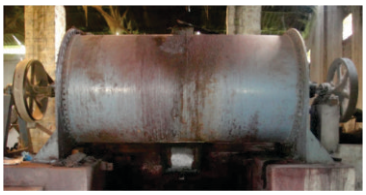

Fig. 6 Washing machine

Fig. 7 Lac grader

Fig. 8 Small scale lac processing unit

Fig. 9 Integrated Small scale lac processing unit

Fig. 10 Hand made shellac

Fig. 11 Machine made shellac

Fig. 12 Chrcoal fired ***bhatta***

Fig. 13 Making of hand made shellac

Fig. 14 Button lac manufacturing

Fig. 15 Button lac

Fig. 16 Steam heated hydraulic press

Fig. 17 Flaking roller

Fig. 18 Bleached lac (powder)

Fig. 19 Bleached lac Pilot plant

Fig. 20 Aleuritic acid (Technical)

Fig. 21 Aleuritic acid (Pure)

Fig. 22 Aleuritic acid Pilot plant

Fig. 23 Lac dye

Fig. 24 Lac dye Pilot plant

lac is mostly exported.

To mechanize the manufacturing process of bleached lac, a pilot plant having capacity 40 kg/day in single shift was developed by previous researchers of ICAR – Indian Institute of Natural Resins and Gums, Ranchi (Fig. 19) consists of dissolution vessel, filtration system, bleaching vessel, horizontal rotary washing mechanism, centrifuge and dehumidified dryer. The developed pilot plant is suitable for manufacturing bleached lac as per second revised Indian standard IS: 17 – 1973.

Mechanization in aleuritic acid manufacturing

Aleuritic acid: Aleuritic acid obtained from seedlac/shellac by saponification is an unique acid which contains three hydroxyl groups out of which two are of adjacent carbon atoms. Aleuritic acid is moderately soluble in hot water and crystallizes out on cooling the solution. Technical grade aleuritic acid is slight yellow in color and almost odorless solid (Fig. 20) which can be further purified using charcoal to obtain pure crystals of aleuritic acid (Fig. 21). It is soluble in the alcohols *i.e.* methyl, ethyl and isopropyl alcohols and mostly exported. It is used as starting material for synthesis of perfumery chemicals like Isoambrettolide, Civeltone etc.

Manufacturing of aleuritic acid

To manufacture aleuritic acid, seedlac is completely dissolved in caustic solution and kept for hydrolysis for a period of 7-8 days. After hydrolysis, the solution becomes viscous due to separation of sodium aleuritate which is then diluted and washed using saturated salt solution, filtered in thick cloth to obtain sodium aleuritate cake. Sodium aleuritate is then dissolved in water and heated to boiling temperature and cooled for removal of wax and strained to obtain filtrate of sodium aleuritate. Filtrate of sodium aleuritate is then acidified with sulphuric acid solution at lower temperature upto desired pH. It is filtered, washed thoroughly using water to make it acid free, dried and powdered.

To mechanize the entire process of aleuritic acid manufacturing from seedlac, a small capacity pilot plant (2 kg/day in a single shift) has been developed at ICAR – Indian Institute of Natural resins and Gums, Ranchi. The developed pilot plant mainly consists of dissolution vessel, storage tanks, filtration system, centrifuge, dryer and pulverizer etc. Pilot plant developed at the institute is generally utilized during training and demonstration under industrial training programme on aleuritic acid manufacturing and is suitable for manufacturing quality aleuritic acid confirming IS: 13160-1991 specifications.

Mechanization in manufacturing lac dye

Lac dye: Apart from the lac resin, sticklac also contains water soluble lac dye. Lac dye (Fig. 23) is a by-product of lac industry recovered from wash water obtained during washing operation of sticklac in presence of water under primary processing of lac for conversion of sticklac in to a semi refined product commercially known as seedlac. Lac dye is mixture of at least five closely related compounds all being anthraquinone derivatives which has been assigned the names as laccaic acid A, B, C, D and E. Lac dye recovered from wash water obtained during washing operation of sticklac with water is non-toxic, hence apart from dyeing in textile industries it is also being used as food additive in foreign countries especially for coloring the food materials (Pandey *et al.*, 2016). Lac dye being natural and non-toxic has great potential compared to synthetic dyes.

Manufacturing of lac dye

Wash water coming out as effluent from lac processing industries during primary processing of sticklac contains lac dye which can be recovered in form of technical grade dye up to maximum possible extent. To recover lac dye as by-product from wash water of lac processing industries, initially wash water obtained during washing of sticklac in presence of water is acidified and decanted after settling of sludge. Clear decanted dye enriched water is then filtered for removal of suspended impurities from water and treated with lime to recover lac dye in form of calcium salt. Calcium salt of lac dye is then precipitated with mineral acid, and crystallized in cold condition (Pandey *et al.*, 2016) for seven days followed by filtration, washing and drying to recover lac dye.

A pilot plant for recovery of lac dye from wash water obtained during washing operation of sticklac to convert sticklac in to seedlac through primary processing of lac developed by researchers of ICAR – Indian Institute of Natural Resins and Gums, Ranchi (Fig. 24) consists of dissolution tank, filtration system, acidification tank and crystallization system etc. The developed pilot plant is suitable for recovery of lac dye inform of technical as well as pure grade. It can handle wash water obtained from washing 400 kg sticklac/batch and can produce upto 1.0 kg lac dye.

CONCLUSION

Lac and lac-based products has immense potential for development cottage industries at village level. Equipments/machineries developed for manufacturing value added lac-based products *i.e.* seedlac, shellac, bleached lac, aleuritic acid and recovery of lac dye may be encouraged so that maximum raw lac (sticklac) may be converted in to value added lac based products which my lead to employment generation through entrepreneurship development in the country and enhanced foreign earning through export. Existing equipments/machineries for manufacturing value added lac-based products are mostly traditional which need to be replaced with automated equipments/machineries made of food grade materials so that quality of the lac-based value-added products may be ensured. Value addition of lac could be promoted and migration of lac growers could be minimized with adoption of value addition of lac at village level so that lac cultivators may get remunerative price of the product. Hence, increase in sustainable livelihood of rural and tribal people might be possible with adoption of lac value addition.

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