LAC CULTURE

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Introduction

- The term “lac” is derived from Sanskrit word “Laksha” meaning hundred thousand
- Atharva Veda
- Rearing of lac insects for commercial production of the lac is called as lac culture
- *Laccifer lacca*

Importance of lac

- Ability to form films on various surfaces
- Electrical insulating properties
- Moulding properties
- Adhesive binding properties
- Flavourless, odourless and edible properties
- Decorative protective properties
- Medicinal properties
- Inflammable properties
- Ability to yield useful acids on hydrolysis

APPLICATIONS OF SHELLAC

- **Pharmaceuticals** -. Shellac is used to coat enteric pills so that they do not dissolve in the stomach, but in the lower intestine, which alleviates upset stomachs. Its also used as a coating on pills to "time release" medication
- **Confectionery** - Shellac is used to provide protective candy coatings or glazes on candies like Reese's Pieces, because of its unique ability to provide a high gloss in relatively thin coatings (like a French Polish). It was used at one time on M&M's. It is approved by the FDA as a food safe coating when dissolved in pure ethanol (not denatured).
- **Hats** - Shellac is used to stiffen felt used to make hats. It allows the makers to shape the felt into brims, bowl shapes, etc.
- **Food Coatings** - Because of its FDA approval, shellac is used to coat apples and other fruits to make them shinier.

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- **Electrical** - Shellac mixed with marble dust is used by lamp manufacturers to glue the metal base to glass incandescent bulbs.
- Other uses for shellac are in the manufacture of grinding wheels (it allows the abrasive particles to break off at the low heat generated by the grinding process, thus exposing new, fresh abrasive particles), leather finishing and painting (shellac pigmented with white titanium dioxide is widely used by painters as a stain sealer, wall board primer, and knot and sap sealer on wood).
- Other former uses for shellac are electrical insulators, as a glue (it bonds glass and metal surprisingly well), phonograph records (the old 78's were a mixture of shellac, fillers and lampblack), hair spray, no-rub floor polishes, and as a finish for bowling alleys (the weight of the ball dropping on the shellac surface did crack the finish).


CND
Shellac
Power Polish
Cream Puff

Scientific classification

Kingdom: Animalia

Phylum: Arthropoda

Class: Insecta

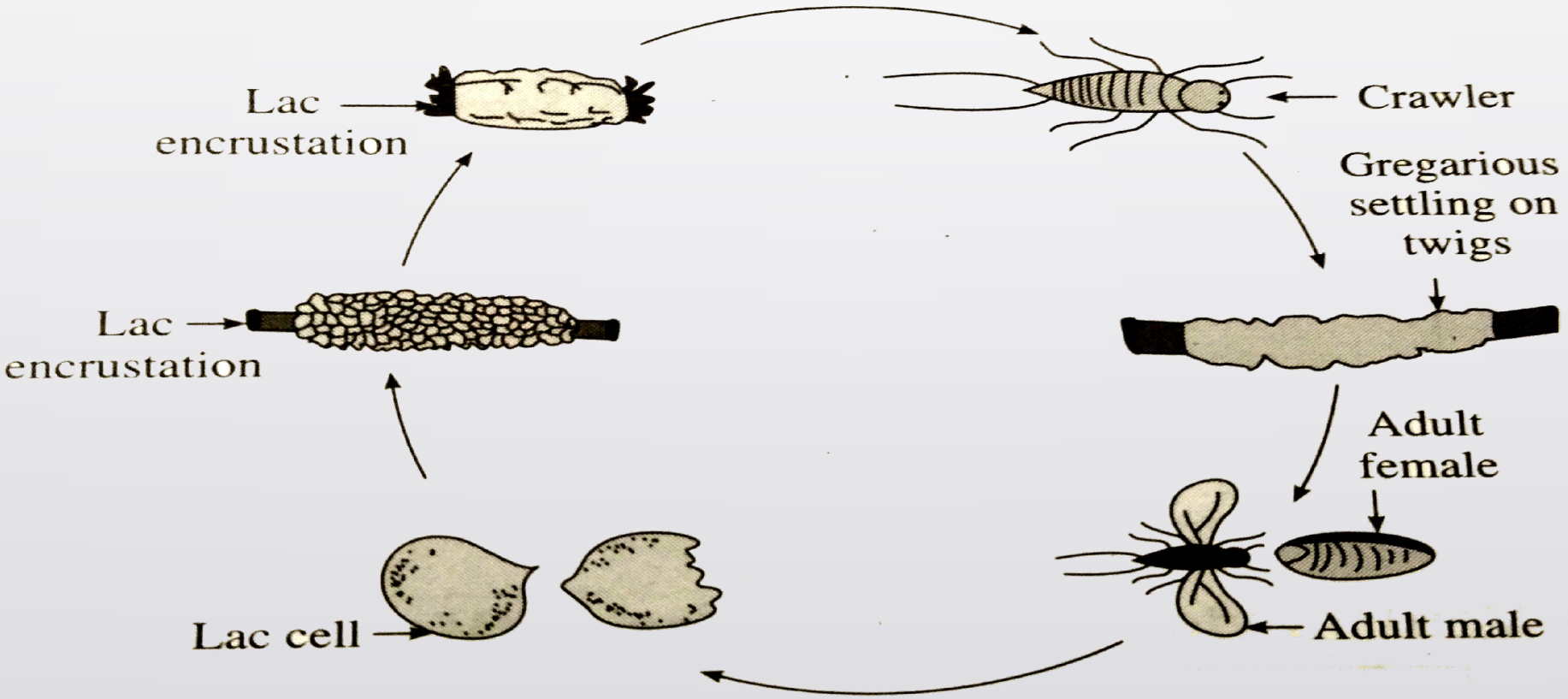
Order: Hemiptera

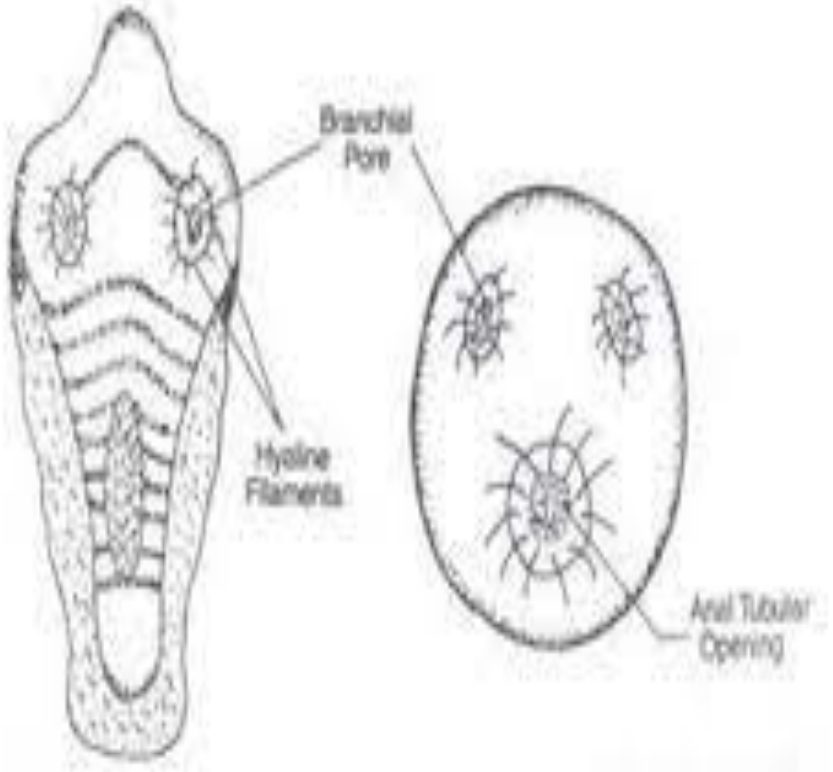
Family: Lacciferidae

Genus: *Laccifer*

Species: *lacca*

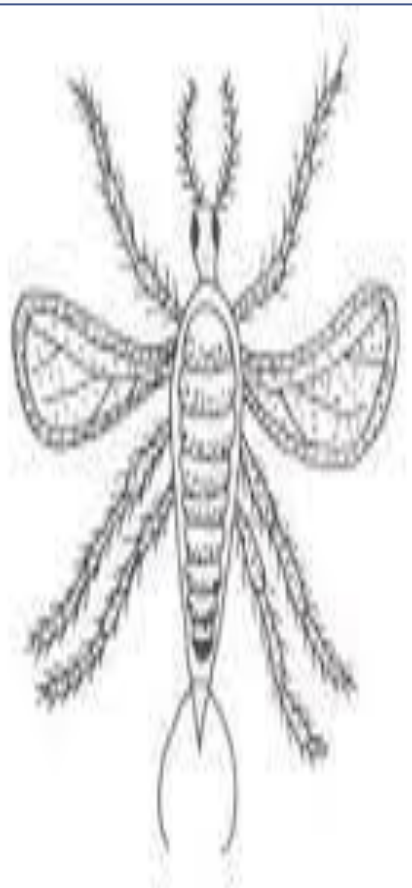
Life cycle of lac insect



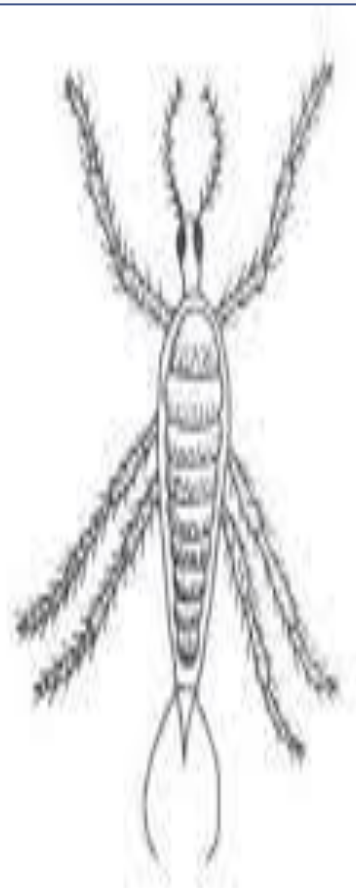


Fig; Male cell

Fig; Female cell



Fig; Male with wings



Fig; Male without wings

Host plants

- *Butea monosperma*
- *Zizyphus jujuba*
- *Schleichera oleosa*
- *Acacia catechu*
- *Cajanus cajan*
- *Acacia arabica*

Pruning

- It means cutting away old, weak and diseased branches to induce the tree to produce maximum number of shoots for successful colonization by the lac insect.
- It should be carried out lightly and branches more than 2.5cm in diameter should not be cut.
- Branches between 1.25cm to 2.5cm in diameter are cut, so as to leave behind a stalk of about 30-45cm in length

Types of pruning

1. **Light pruning**

- Diseased and dead portion of branches should be removed completely

2. Basal/heavy pruning

- In quick growing bushy host, pruning should be done at a height of 10-15cm from the ground level
- eg. *F.semialata, F.macrophylla*

- Kusum(*Schleichera oleosa*) either in January/February or June/July
- Khair(*Acacia catechu*): done in march. However, harvesting of lac crop during February may be used to serve as pruning
- Ber(*Zizyphus mauritiana*) or palas(*Butea monosperma*): done in February for inoculation in July and in April/May for inoculation in October-November
- *Ficus* spp: pruning is to be done in April for inoculation in July and in May for inoculation in October

Lac cultivation

1. Inoculation

2. Swarming

3. Harvesting

Inoculation of host trees

- The method by which the lac insects are introduces to the new lac host plant is known as inoculation.

1. **Natural inoculation**

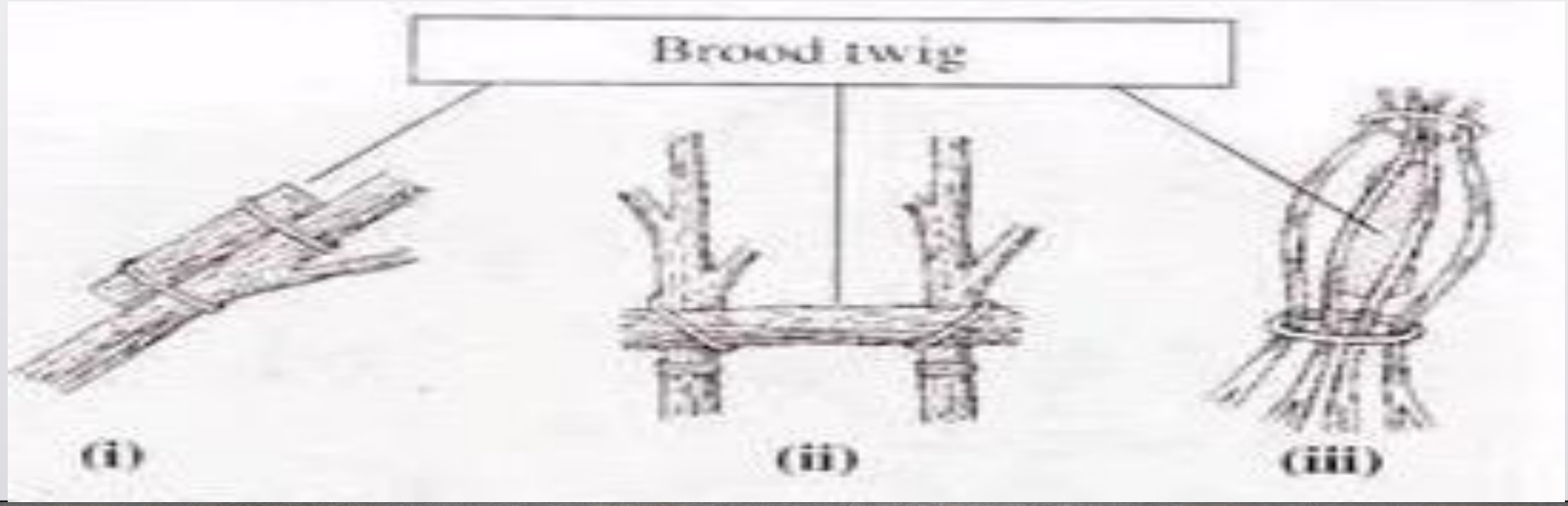
- When infection from one plant to other occurs by natural movements of insect, it is called natural inoculation.
- This may be due to overcrowding of insect population and non availability of tender shoots on a particular tree.

Collection of brood lac

- Lac sticks, having mature female insects ready to give rise to the next generation are called Brood lac.
- Prior to about two weeks of hatching, lac bearing sticks are cut to the size of six inches called Brood lac.
- Selection of brood lac healthy lac with the minimum signs of predator and parasite damage is selected for use as brood lac.

Artificial inoculation

Brood lacs are then kept for about two weeks in some cool place, when the larvae start emerging from this brood lac, they are supposed to be ready for inoculation.



Inoculation period

Strain	Crops	Normal inoculation period
Rangini	*Baisakhi*	Oct./Nov.
	Katki	June/July
Kusumi	*Aghani*	June/July
	Jethwi	Jan./Feb.

Coupe system

- Developed for lac production on sustained yield basis.
- If the same tree is inoculated, its vitality suffers and the yield of crop progressively diminishes
- In *Rangeeni* farms, two coupe system, two coupes having six months rest is adopted for raising. *Baisakhi*-cum-*Katki* crops in alternate seasons.
- The trees are inoculated in the month of Oct-Nov. Harvesting is done after a year, after allowing self-inoculation in June-July by partial harvesting.

- In the Kusumi farms, Kusum is the major lac host plant species of

Crops of lac

Inoculation with Lac swarming larva	Emergence of male insects	Crop harvested	Female insects mature and give rise to swarming larvae
A. ***Rangeeni* crops**			
Katki crop(June-July)	Aug-Sept	Oct-Nov	Oct-Nov
Baisakhi crop(Oct-Nov)	Feb-March	April-May Leaving a certain amount of lac on trees to mature and act as brood in July	June-July
B. ***Kusumi* crops**			
Aghani crop(June-July)	Sept.	Dec.-Jan	Jan-Feb
Jethwi crop(Jan-Feb)	Mar-April	June-July	June-July

Share in production

- *Katki*-33.39%
- *Baisakhi*-27.35%
- *Jethwhi*-19.50%
- *Aghani*-19.42%

Swarming

- At the time of swarming, insect muscle contract and insect get detached from the place of attachment and when the eggs are be hatched out they become orange colored.
- Thus, the change in color is an indication of swarming has taken place

Harvesting

- ***Ari* Lac:** If lac crops are harvested little before the larval emergence

  (immature lac)
- ***Phunki* Lac:** after the emergence is over, that is called Phunki Lac(empty lac)
- Immature harvesting which would affect the population of lac insects and ultimately result in great economic loss to the cultivators. Hence, immature harvesting should be discouraged

Manufacturing of Shellac

1. Production of crushed lac

- Remove lac encrustation from the branches either by twisting them or scrapping by knife
- Scrapped material is called as raw lac or stick lac(Crude lac)
- Powdered stick lac is called as crushed lac

Production of seed lac or grain lac(*Chowri*)

- Keep the crushed lac immersed in water in cement tubs for 3 days stir the contents
- Drain off the supernatant colored liquid
- Transfer the material that settle at the bottom to large vats
- Add water and lime at 1kg/160kg of vat
- Collect the lac dye which settles down
- Remove the bits of twigs, fibrous material and parts of insects body that floats in vat

Methods of lac processing

- Seedlac is often the base material which is further processed.
- The processing results into finished product-Shellac

1. Hand made process
2. Mechanized heat process
3. Solvent processes

Hand made process

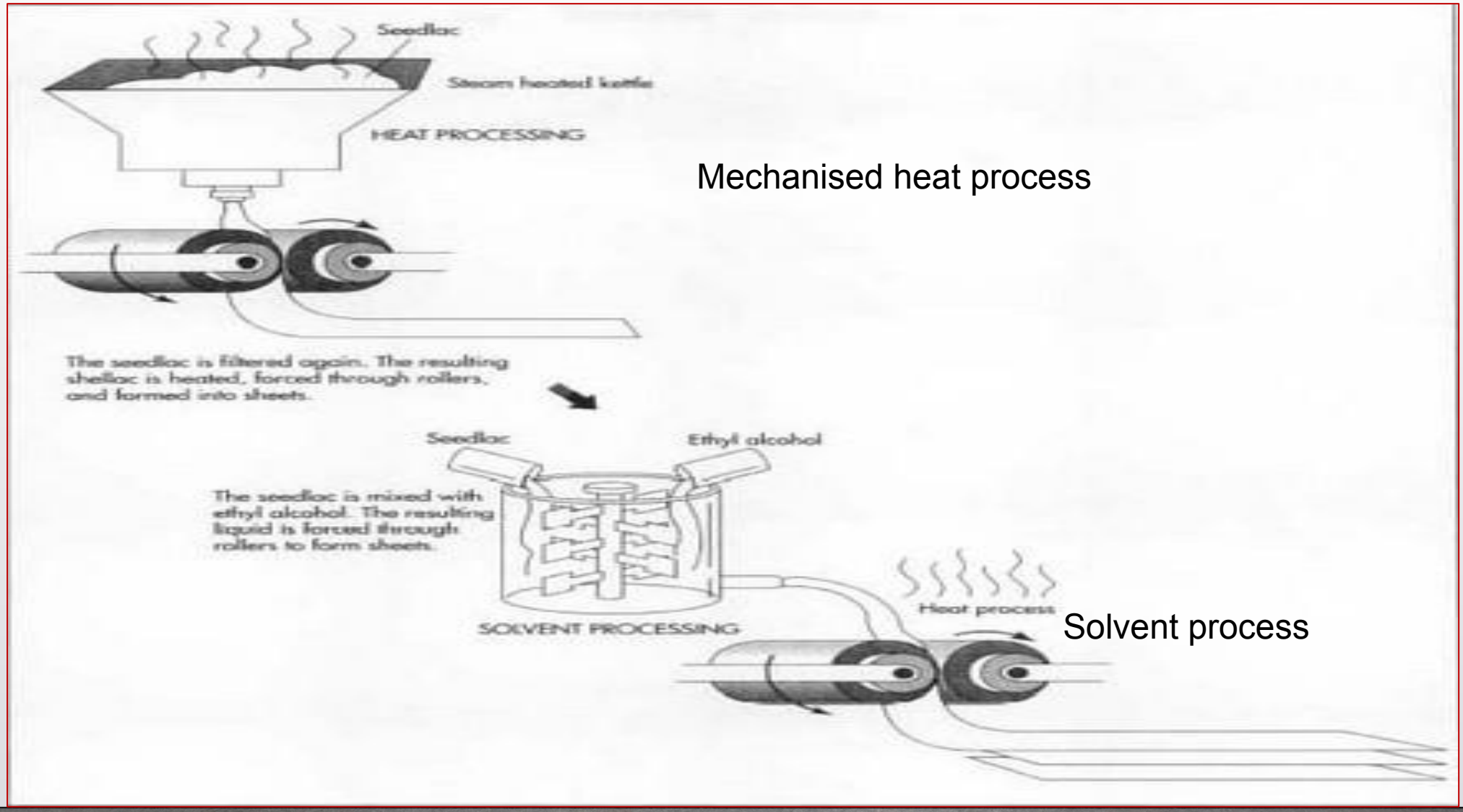
- Traditional method
- The seed lac is filled into a long sausage shaped cloth bag of about 2 inch diameter and 30 feet long.
- The cloth bag is filled with approximately 40kgs of seed lac.
- The long bag made up of markin cloth is passed gradually in front of a charcoal-fired hearth hot enough to melt the lac.
- By twisting the bag, molten lac is squeezed out through cloth.
- Due to hot melting and squeezing, lac resin is forced out through the pores of the bag; leaving behind impurities such as insect bodies or twigs.
- The residue left inside cloth bag is known as *Kiri* lac.

Mechanized heat process

- The seed lac is melted by steam heat.
- The molten soft lac is squeezed through filter by means of hydraulic pressure.
- The filtered molten lac is drawn into long and continuous sheets with help of roller.
- The sheet is then broken into pieces called flakes.

Solvent processes

- To purify the semi refined lac, dewaxed and decolorized shellac can be obtained as end product.
- Seed lac is dissolved in a refrigerated alcohol and filter through filter press to remove wax and impurities.
- The color may be removed by treating with the activated carbon.
- The molten shellac is stretched with a roller.



Mechanised heat process

Solvent process

Seed lac

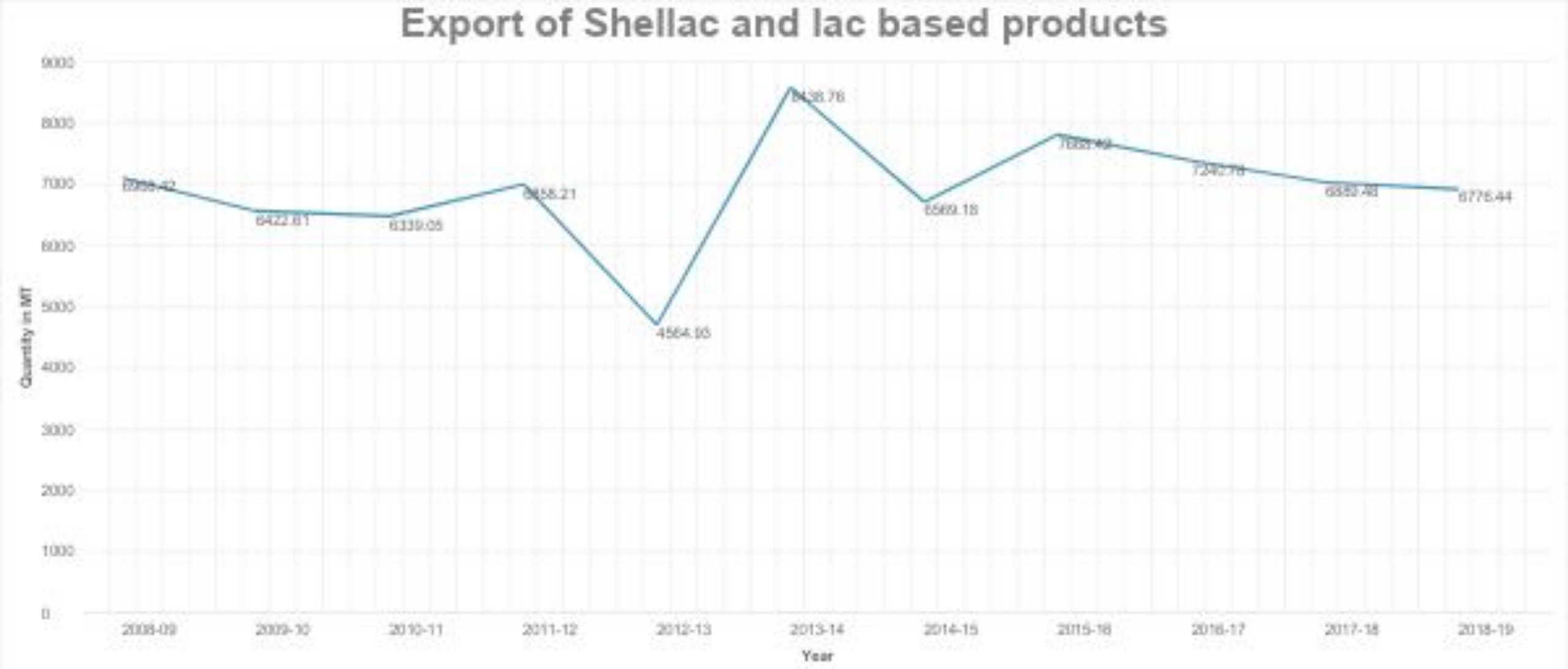
Shellac

Button lac

Garnet lac

Export potential

Export of Shellac and lac based products		
Year	**Quantity in MT**	**Value in USD Mn**
2008-09	**6968.42**	**27.36**
2009-10	6422.61	23.21
2010-11	6339.05	44.64
2011-12	6858.21	72.04
2012-13	4564.93	83.48
2013-14	8438.76	99.44
2014-15	6569.18	53.06
2015-16	7668.42	38.52
2016-17	7240.78	30.86
2017-18	6889.48	34.15
2018-19	6776.44	32.58


Export of Shellac and lac based products
Quantity in MT
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
6422.81
6339.05
6858.21
4564.95
8638.76
6569.18
7249.76
6650.48
6776.44
2008-09
2009-10
2010-11
2011-12
2012-13
2013-14
2014-15
2015-16
2016-17
2017-18
2018-19
Year

http://www.shefexil.org/

Thank you