

# Indian Lac Association for Research.

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## ANNUAL REPORT

(1st April 1925 to 31st March 1926.)

This report covers the period 1st April 1925 to 31st March 1926.

*Buildings and Well.*—The Institute building was not completed as early as I anticipated in my previous report so that it was not possible to start work in the Biochemical Section until the beginning of September.

It was also found that the site originally selected for the sinking of a well was unsuitable and it was finally decided to approach Government for permission to sink one on Government land near the present Vaccine Depot well. Sanction for this was accorded and work has been started and the new well should be working in about six months. A pumping test carried out in the Vaccine Depot well, the results of which were reported to the Committee, was very satisfactory and it is hoped that the Association well will be able to supply the whole requirements of the Estate.

The present water supply is still from an open tank about three quarters of a mile from the Association Estate and is thoroughly unsatisfactory from a health point of view.

*Estate.*—The buildings on the Estate were all completed during the current year. The drainage, however, has not proved very satisfactory and in view of the necessity for better sanitation the Divisional Engineer, Sanitation, to the Government of Bihar and Orissa, has kindly consented to visit the Estate early in April and give his recommendations on this point.

The work of cleaning up this portion of the Estate has already been started and ornamental trees have already been planted along most of the roads and are doing well.

A tennis court has been provided for the staff and is greatly appreciated by them.

*Staff.*—Most of the Biochemical Staff joined duty in June 1925.

The Senior Assistant contracted typhoid in January this year due, according to the Civil Surgeon, to the insanitary water supply and I regret to inform the Committee that he is still far from well and that it will be some considerable time before he is fit for duty again.

*Entomological Staff.*—This Section under Rai Bahadur C. S. Misra joined duty in January and February this year. There has been considerable trouble in filling the assistants posts in this Department and the only one appointed has since resigned.

*Plantation.*—The area of this portion of the Estate is approximately eighty-five acres. Five blocks of eleven acres each have been taken up for the cultivation of—

Zizyphus jujuba,  
Butea Frondosa,  
Acacia Catechu,  
Zizyphus Xylopyrus,  
Schleichera trijuga.

Sixteen acres have been allotted to the Entomological Section and about four acres have been utilised for the growth of the above host trees under natural conditions that is to say no cultivation manuring or irrigation has been given to them. Other small portions have been utilised for the trial of various acacias and other species sent in by Officers of the Forest Department and others.

The total remaining area is about eight acres the whole of which will be taken into cultivation during the coming rains so that in a few months there will be no further room for expansion on the present Estate. Weather conditions have been good throughout the year with the exception of a very severe hail storm in March.

*Manuring of the five main blocks.*—A green manure crop was sown during the rains of 1925 and half an ounce of ammonium sulphate per tree was also given in January this year.

Cultivation has been continuous and there is a great improvement in the soil of the plantation in consequence.

No irrigation was carried out on this portion of the Estate.

*Zizyphus jujuba*.—This plot has done extremely well during the past year. It was completely stripped of leaves by the hail storm but since then has flushed again and will be ready, provided weather conditions are satisfactory, for a light infection in June-July 1926.

*Acacia Catechu*.—This plot also has made good progress but has not yet recovered from the effects of the hail storm to the same extent as the previous named plot. It should, however, also be ready for a light infection at the same time.

As these two plots have now arrived at the bearing stage—manurial plot, pruning experiments and other work will be started. This, however, forms the subject of another report on the working of the plantation so I do not propose to go into detail here.

Of the other three plots the *Butea Frondosa* is the most backward, it is, however, just coming into leaf again now and should come away well after the next rains.

The *Zizyphus Xylopyrus* and *Schleichera trijuga* are both doing very well and all the vacancies in the former have now been filled.

The twelve *Leea Crispa* plants brought from Assam by Mr. Marshall, at first did not look as though they would do well in this climate and three have died. The remainder are now growing well but this may in part be due to the exceptionally cool weather this year and the amount of rain which has fallen so that no definite opinion as to the utility of this host in this district can be given as yet.

Further trials of hosts from Assam will be made during the next season.

*Cajanus Indicus*.—A small plot of this plant grown from seed obtained from Assam where it is more generally used as a host than elsewhere has already been infected.

The seed was sown at the end of May 1925 and the plants were sparingly infected with broodlac from *Schleichera trijuga* in December-January.

The infection took remarkably well and although not intended to yield quantitative results should give valuable qualitative ones.

In connection with the trial of this host the Imperial Agriculturist, Pusa, is sending to the Nankum Institute seed of three selected pure strains. This seed will be sown in May 1926 and its lac producing capabilities tested quantitatively and compared with results obtained from Assam seed.

The above-mentioned plot also suffered considerable damage during the hail storm, a great deal of the lac was killed and the plants were also injured. In spite of this the surviving lac is quite healthy and the plants are also in a healthy condition.

This trial is interesting when compared with a similar one made in the Ranchi district using local *Cajanus indicus* plants as hosts. These were planted as seed in May 1924 and not infected with lac until October 1925. The lac took very well indeed, but the host has since died. Without further trials it is impossible to say whether this result was due to the type of host used, its age, or the time of infection.

*Shorea talura*.—This is one of the Mysore hosts trees and a small area of it has been laid down at Nankum.

As the report on a trade test of lac from this host was not altogether favourable it is not proposed to plant it in large quantities, but merely to keep a small block to find out whether the lac grown on it in the climatic conditions obtaining at Nankum differs in any respect from that grown in Mysore.

The block reserved for the growth of *Zizyphus jujuba*, *Schleichera trijuga*, *Butea frondosa*, *Zizyphus Xylopyrus* and *Acacia catechu* under natural conditions, that is to say, without manuring, cultivation or irrigation, is extremely interesting from the contrast it already forms to the rest of the estate. None of the seedlings are more than two or three inches high and the percentage of vacancies is very great.

As soon as it is possible to obtain a photograph of this block, a copy with comparative ones from the rest of the estate will be sent to the Committee. At present it is impossible on a photograph to distinguish the seedlings from the surrounding vegetation.

*Field Work*.—Experimental work has now been started in Government Forest areas both at Kundri and Ketchki, Palamau District, Bihar and Orissa.

Plots have been laid out in duplicate at both places with the object of studying the effect on the lac crop of cultivation, manurial treatment and irrigation.

The plots have been arranged as follows :—

PLOT 1.

No Lime.

	1	2	3	4	5	6	7	8
1	No manure.	Nitrogen.	Nitrogen and Potash.	Nitrogen and Phosphates.	Nitrogen and Potash and Phosphates.	Potash and Phosphates.	Potash.	Phosphates.
2								
3								
4								
5								
6								
7								
8								
9								
10								

PLOT 2.

Lime.

	1	2	3	4	5	6	7	8
1	Manures similar to Plot 1.							
2								
3								
4								
5								
6								
7								
8								
9								
10								

The numbers down represent trees, the numbers across plots. Consideration will be given to—

- I. The yield produced.
- II. The quality of lac produced.
- III. The effect on the vitality of the host plant.
- IV. The effect on the shoots produced after pruning.

In addition it is hoped to test some of the suggestions put forward by Mr. Srinivasaya, Bangalore, as the result of his work published in the Journal of the Science Association, Maharajah's College, Vizianagram, Vol. I, No. 4, pp. 133—145.

In this paper he states that potassium, sodium and calcium are necessary to the lac insect, but that as regards calcium if brood is cultured on plants fed without magnesium a preponderance of males results due to the unbalanced action of the calcium. Such conditions would of course result not only in a poor incrustation, but also in a poor brood for the following season.

These experiments I understand were carried out on the host *Acacia farnesiana* cultured in various nutrient solutions (no details as to the actual composition being given) that is to say under very artificial conditions and it is hoped that the field work now being carried out in Palamau will give some indication as to the correctness of these views.

The host tree in the Kundri Forest area is *Butea frondosa* and at Ketchki, *Acacia catechu*. Root dissections of both hosts are being carried out as obviously trees with a good lateral root system will benefit more from the application of manures than those which have not. Also when an average figure for root spread has been obtained it will aid in the determination of the area to be manured in order to give the tree the greatest benefit from the manures applied.

Several European planters have been interested in lac cultivation and advice has been given in the laying out of plantations. These should yield useful information in conjunction with the field work already undertaken by the Lac Research Association.

The Forest Department, Bihar and Orissa as in the preceding years has continued to give all possible help to the Association and

is expediting its programme of brood farm establishment as much as possible.

*Biochemical Section.*—Much of the Research Work carried out in this section naturally follows the work being done in the plantation and the field experiments already instituted.

Soil analyses have been made of samples taken before the application of manures from the two forest areas already mentioned. Both show a deficiency in lime, nitrogen, phosphorus and potash.

In addition to this samples have also been taken before the application of manures of young growing shoots suitable for lac infection. These are being analysed and an endeavour made to investigate the difference in nutritive value between shoots from trees which have been manured and those which have not. This will also be indicated by any difference in crop yield.

The age of the trees in the above areas is not known so that this factor will have to be taken into account when similar work is instituted on the host trees on the Nankum Estate.

In addition to the above work a chemical analysis of good and bad host trees is being carried out. A great many factors enter into an investigation of this type. It may be found that certain constituents are essential and that they are required in certain proportions and that in addition they must be present at a time when the development of the lac insect calls for them. The question of reaction must be considered also the possibility of the presence of inhibitors, the effect of climate has also to be taken into account.

The above paragraph gives a very brief summary of the scope of work of this kind but the various points will be taken up in more detail as work progresses and results are obtained.

Pot culture experiments using *acacia catechu* as host, have been started in order to find out the optimum condition of growth of the host as well as of the lac insect, by varying, eliminating and testing different kinds of manures.

An investigation into the food requirements of the host (*Zizyphus jujuba*) at different ages from the seed to the time when it is infected with lac, during the period of infection, and in succeeding years is being carried out.

It will be possible in this way to trace the movements of the various elements of plant food taken from the soil and utilised in the process of building up the various parts of the plant.

It should be possible when these figures are obtained to judge the amount and kind of manuring necessary to keep the host and the lac crop grown on it in optimum condition.

If there is a deficiency in plant food one would expect to find it after the cutting of the lac crop and from the figures obtained as above, the quantities to be returned to the plant should be readily estimated.

Each of the main plant foods will be dealt with in turn.

*Entomological Section.*—A programme of work for this section had already been submitted to the Committee so that it is not necessary to repeat it here.

Arrangements for field work in the Muthrapur Zemindary, Malda District, are being made and it is hoped when this is started that valuable information both as regards the lac insect and its parasites and predators will be obtained.

The Entomologist considers that the above state of things is due largely to poor brood lac brought about by continued inbreeding, with as a consequence heavy parasitisation. He therefore intends to start work on selection, hybridisation, parasites and predators and the estate being in such an unsatisfactory condition should give ample scope for Entomological Research.

Work on the biological study of the *Schleichera trijuga* species of lac insect has been started and also on the selective limit of this species.

Different types of lac insect are being tried on a variety of hosts with a view to increasing the number of the latter at our disposal.

Work on one of the chief enemies of the lac insect, *viz.*, *Eublemma amabilis* is in progress and also on pests of the host trees of the lac insect.

A study of the cause of premature death of lac larvae has also been started.

As this section only came into being in January this year there has not yet been time for any material results to be obtained.



A portion of the plantation measuring about sixteen acres has been definitely allotted to the Entomological section and the scheme of planting and work for this will be submitted to the Committee in due course.

*Visitors.*—His Excellency the Governor of Bihar and Orissa visited the Estate in September.

Sir Peter Clutterbuck, Inspector General of Forests, Government of India, visited the Estate in May.

Mr. Mulford, of the Shellac Association of America also paid a visit to the Estate in December. A great many Government officials and others have also been shown round from time to time.

I should again like to say that I shall be very pleased to show any member of the Association the work going on now at Nankum, it is much easier to grasp what is being done by a personal inspection rather than by studying reports.

In conclusion I should like to express my thanks to the Committee for the help they have given and the way in which they have facilitated work wherever possible.

*May 1926.*

*Staff employed at the Indian Lac Research Institute at Nankum  
up to the end of 30th April 1926.*

Serial No.	Names.	Designation.	REMARKS.
<b>Biochemical Section.</b>			
1	Mrs. Dorothy Norris	... Director and Biochemist.	
2	Mr. D. N. Gupta	... 1st Asstt. to Biochemist.	
3	„ M. Rangaswamy	... 2nd „ „ „	
4	„ M. Venugopalan	... Field Chemist.	
5	F. Arockiswamy	... Lab. Asstt	
6	Syed Lutfur Rahmon	... „ „	
<b>Entomological Section</b>			
1	Rai Bahadur C. S. Misra	... Entomologist.	
2	Mr. E. Heber	... Artist.	
3	„ K. Krishna Rao	... Senior Fieldman.	
4	„ J. N. Roy	... Junior „	
5	„ J. N. Sinha	... „ „	
6	„ K. C. Chatterjie	... Lab. Asstt. & Setter.	
7	„ M. P. Srivastava	... Clerk.	
<b>Office.</b>			
1	Mr. J. K. Mukerjee	... Head Clerk.	
2	„ G. B. Thapa	... 2nd „	
<b>Mechanical Section.</b>			
1	Mr. K. C. Guha Roy	... Head Mechanic.	
2	„ B. B. Mukerjee	... Fitter.	

The Menial Establishment comprises ten persons.