वार्षिक प्रतिवेदन
1997-98
Annual Report

भारतीय लाख अनुसंधान संस्थान
राँची, भारत

Indian Lac Research Institute
Ranchi, India

वार्षिक प्रतिवेदन 1997-98

Annual Report 1997-98

1998

भारतीय लाख अनुसंधान संस्थान
(भारतीय कृषि अनुसंधान परिषद्)
नामकुम, राँची 834 010, भारत

Indian Lac Research Institute
(Indian Council of Agricultural Research)
Namkum, Ranchi 834 010 India

Citation:
Annual Report 1997-98, Indian Lac Research Institute, Ranchi 834010
(*Ann. Rep. 1997-98*, Indian Lac Res. Inst., Ranchi)

Published by Dr S. C. Agarwal, Director, Indian Lac Research Institute, Namkum, Ranchi 834 010 Bihar, India

Printed at Kailash Paper Conversions (P) Ltd., Ranchi 834 001

This report pertains to the period : April 1997 to Dec. 1997. The financial statement covers upto Mar. 31, 1998. The co-operation rendered by various staff members in the preparation of the manuscript is thankfully acknowledged.

Contents

PREFACE

The institute continues its relentless R&D efforts, for the promotion of lac industry in the country. The very factors which influence the production and utilization of lac exert an indirect yet significant effect on both research and extension programmes. Price of the commodity directly affects the economics of product development and promotion. A stable and healthy market environment of the commodity is essential for the development of long-term strategies for research programmes.

The fruits of research in the areas of lac production, processing and utilization cannot be realized, unless the maladies affecting the industry as a whole are not effectively tackled. This year, the lac market witnessed a heavy slump in the price of lac, adversely affecting the subsequent production due to overdependence of shellac manufacturers and exporters on foreign market. They have been indifferent to increasing the domestic consumption, through products and processes developed by the institute.

There appears to be a hope of recovery of lac prices, judging from the current trends. But, it will be sometime before various factors get stabilized. This was one of the issues which received maximum attention during the recent symposium organized at the institute. Lac, tasar, minor forest produce form an important component of the tribal economy and any improvement in production and procurement will undoubtedly have significant impact on the tribal economy of the region. This was the driving principle which prompted us to organize the above symposium on "Bioresources of Chhotanagpur and Their Industrial Significance." Under the present international scenario there is a compelling need to identify, document and protect the bioresources of our country. This realization has led to a great rise in such initiatives through out the country.

Notwithstanding the present plight of lac as a commodity, the research priorities are being suitably reoriented for developing means of achieving full utilization of the potentials of this commodity; for, lac is a commodity of the future.

S.C. Agarwal

(S.C. Agarwal)

DIRECTOR

प्रस्तावना

देश में लाख उद्योग की प्रगति के लिए संस्थान द्वारा अनुसंधान एवं विकास हेतु सतत् प्रयास जारी है। लाख के मूल्य का प्रभाव उत्पादन में उपयोग के साथ-साथ परोक्ष रूप से इसके अनुसंधान एवं प्रसार कार्यक्रमों पर भी पड़ता है, जो प्रत्यक्षत: उत्पाद विकास एवं प्रगति को प्रभावित करता है। अनुसंधान कार्यक्रमों के लिए दीर्घावधि रणनीति के विकास के लिए वस्तु की विपणन व्यवस्था का स्थाई एवं अनुकूल होना आवश्यक है।

उद्योग को प्रभावित करने वाले व्यवधानो का प्रभावी रूप से नियंत्रण नहीं होने से लाख उत्पादन, संसाधन एवं उपयोग के क्षेत्र में अनुसंधान का लाभ नहीं मिल पाएगा। विदेशी बाजार पर चपड़ा निर्माताओं एवं निर्यातकों की अति निर्भरता के कारण इस वर्ष लाख के बाजार मूल्य में भारी गिरावट देखी गई जिससे उत्पादन पर विपरीत प्रभाव पड़ा। वे संस्थान द्वारा विकसित उत्पादों एवं संसाधनों के माध्यम से लाख पदार्थों की घरेलू खपत बढ़ाने के प्रति उदासीन रहे हैं। वर्तमान परिस्थितियों को देखने से लाख के मूल्य में सुधार की आशाएं जगती है। परन्तु इसके पूर्व विभिन्न पहलुओं का स्थायीत्व आवश्यक है। संस्थान में हाल में आयोजित संगोष्ठी के दौरान इस विषय पर सर्वाधिक ध्यान दिया गया। लाख, तसर एवं छोटे सीमित वन पदार्थ आदिवासी क्षेत्र की अर्थव्यवस्था के लिए काफी महत्वपूर्ण है तथा इनके उत्पादन एवं विपणन में सुधार इस क्षेत्र की अर्थव्यवस्था को प्रभावित किये बिना नहीं रह सकती। इन्हीं स्थितियों ने हमें ''छोटानागपुर के जैव संसाधन एवं उनके औद्योगिक महत्व'' विषय पर संगोष्ठी आयोजित करने के लिए उद्धेलित किया। वर्त्तमान में हमें अन्तर्राष्ट्रीय स्तर पर अपने देश के जैव संसाधनों की पहचान करने एवं संरक्षित रखने की बेहद जरूरत है। इन्हीं परिस्थितियों के आलोक में पुरे देश में इस ओर कदम उठाए गए हैं।

संप्रति, वस्तु के रूप में लाख की दयनीय स्थिति के बावजूद इसे भविष्य की सामग्री के रूप में स्थापित करने के उद्देश्य से इसकी पूर्ण क्षमता के उपयोग हेतु तरीके विकसित करने के लिए समुचित अनुसंधान प्राथमिकताएं तय की जा रही हैं।

सतीश चन्द्र अग्रवाल

(सतीश चन्द्र अग्रवाल)

निदेशक

EXECUTIVE SUMMARY

This year marked the beginning of the Golden Jublee Celebrations throughout the country to mark fifty years of India's independence. The institute also took initiative to conduct special programmes to mark the occasion. One of these was to organize a symposium on "Bioresources of Chhotanagpur and Their Industrial Significance" on 20th September, the foundation day of the institute. Chhotanagpur is biogeographically distinct part of this region and holds a vast treasure-house of biodiversity. Various papers presented during the symposium and subsequent discussion emphasized the need for initiation of steps for preserving this bio diversity.

Research

The researches at this institute are aimed at bringing about improvements in lac culture, processing and utilization. Some of the significant contributions made in this area during period have been summarized below.

- There is a renewed demand for natural dyes including lac dye in textile and food industry. Indian lac industry has a vast untapped potential for production of lac dye. The ILRI has taken initiative to improve the methods for isolation of lac dye during processing. Methods have been standardized, on lab scale, for the preparation of calcium salt of lac dye, crude lac dye and pure lac dye (90%)
- Shellac possesses certain unique electrical properties for its use in electrical insulation. But its thermal resistance is low , limiting its application in this field. Continuous efforts are being made to improve the thermal resistance by modification with suitable synthetic resins. As a result, a baking-type high thermal resistant insulating varnish has been developed based on shellac, a synthetic resin and common solvents; modified lac films possess, flexibility and thermal resistance up to 200-220°C, besides adequate dielectric properties.
- Aleuritic acid is one of the constituent acids of lac resin and can be isolated adopting simple procedure. It has been found that this compound can be used as starting material for the synthesis of many costly compounds of economic value. The process for isolation of aleurtic acid, from fresh and old samples of seedlac and *kiri* (a by-product of lac industry), has been optimised.
- Use of insecticides, in general, is being discouraged to minimize the environmental pollution. One of the alternative systems of pest management is application of sex

pheromones for monitoring and control. Two such compounds, (*Z*)-9-hexa-decen-1-ol and its acetate, present as sex pheromone components of lepidopterous pests have been synthesized from *erythro*-aleuritic acid.

- A thorough understanding of physical properties such as melting properties is helpful in product formulation and evaluation. The lac exhibits unique melting behaviour. The melting profile of lac using differential scanning calorimetry was studied which revealed that lac melting is a two-step process; this can also be used for detecting the presence of wax in lac samples. The study has also confirmed that lac is not truly a thermosetting resin.
- *Ber* is one of the major hosts of lac and can be successfully used for raising *kusmi* lac crop which fetches higher price in the market. It has been found that for raising rainy season *kusmi* lac crop on *ber* , inoculation during monsoon period results in maximum larval density of settlement and minimum mortality.
- After repeated field trials, cultivation practices for raising *rangeeni* lac crops have been modified to maximize broodlac and sticklac yields on *palas* and *ber* , for exploiting these hosts separately.
- Biological control measures for pest management have received greater attention because they are ecologically safe. There is ample scope for using parasitoids for the control of the lepidopterous pests of lac insects. In this direction, five potential egg parasitoids have been identified for the biological control of the lepidopterous lac predators, which cause considerable damage to lac crops.
- Lac insect stocks were collected from different hosts occuring in agro-climatic regions 2 and 5. They included six recorded species of lac insect and four, differing from hitherto recorded species.

Linkages

In order to widen the education, research and extension base of lac, an MoU was signed between Birsa Agricultural University , Kanke and the institute for mutual co-operation in various areas of their activities. This includes incorporation of lac culture and industrial aspects in the academic curriculum of B.Sc. (Ag) course of the university. The experts of the institute will be involved in the academic programme.

Infrastructure development

The ARIS Cell of the institute was inaugurated by Mr Pralay Talukdar,

Minister-in-charge for Small Scale and Cottage Industries, West Bengal. This cell serves as a valuable means for fast communication and information access through VSAT.

Publicity

A sale counter of lac-based products has been opened at the institute. This counter will be useful in popularizing and promotion of various lac-based products developed by the institute, thereby paving way to increased utilization of lac. The institute also brought out twelve publications which included a book, "Proceedings of the national seminar on Lac Industry— Challenges and Solutions."

Perspective Plan

This year also saw extensive deliberations to finalise the blueprint of the future activities of the institute. The perspective plan for 25 years, the Vision 2020, which was the outcome of several brainstorming sessions and in-depth analyses, at various levels, was released. The quinquennial review team was also at the institute reviewing the progress of the work of the institute and interacting with the scientists of the institute to evolve the short-term research strategies and programmes.

INTRODUCTION

Historical

The Indian Lac Research Institute was established in 1925. The institute came into existence as a result of the recommendation of a two member committee comprising of Mr. H.A.F. Lindsay and Mr. C.M. Harlow, appointed early in 1920 by the then Govt. of India to enquire into the conditions of the Indian lac trade and suggest measures for all round improvement. The report of the committee was published in 1921. They had recommended, besides other aspects, for intensive cultivation by significantly tested methods for sustained lac production. In view of this suggestion, the then lac merchants organised themselves into a private registered body, the Indian Lac Association for research. The association acquired land from the provincial government and Institute started functioning under the founder Director, Mrs. Dorothy Norris.

Initially the Institute consisted of entomological section as the principal unit supported by a biochemical section. Subsequently, in 1920s a physico-chemical section was added to take up applied research. Later, these two chemical sections were combined to form a Chemical Division. The scope of this Institute was thus widened to cover both the entomological and chemical aspects.

In 1930, on the recommendations of the Royal Commission for Agriculture, the Indian Lac Cess Act was passed by the Central Legislature. Under this Act, the Government of India constituted the indian Lac Cess Committee which took over the Institute from "Lac association" in 1931.

After the second world war, the First and Second Review Committees set-up in 1951 and 1956, formed broad research programmes with equal emphasis on fundamental and applied research. During the period, four Research Field Research Stations were set-up at Jhalda (W.B.) Damoh, Umaria (M.P.) and Mirzapur (U.P) to take up regional problems. Later, Regional Testing Laboratories were also established to support lac manufacturers for quality control of different types of lac manufactured by them. These were set-up at Gondia (Maharastra), Jhalda (W.B.) in 1959, at Balrampur (W.B.) and Daltonganj (Bihar) in 1961 and at Namkum (Bihar) in 1962.

Indian Council of Agricultural Research (ICAR) took over the Administrative Control of the Institute on 1st April 1966, with the abolition

of the Lac Cess committee on this day. The Institute was strengthened and reorganised in December 1971 based on the recommendation of Sheshadri Committee, into five Divisions viz., Chemistry, Entomology, Agronomy & Plant Genetics, Technology and Extension.

The Institute

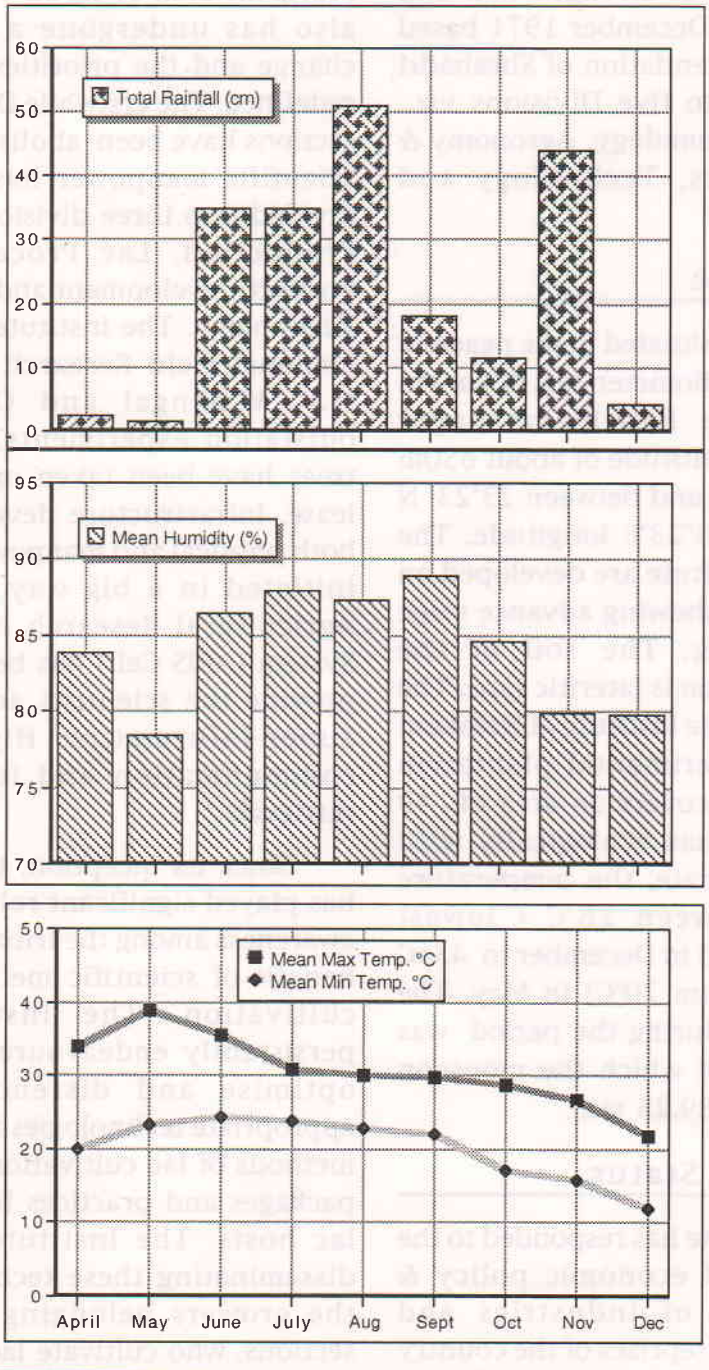
The ILRI is situated in the peaceful suburbs, nine kilometer east of Ranchi town, on the Ranchi-Tatanagar Highway,at an altitude of about 650m above sea level and between 23°23' N latitude and 85°23'E longitude. The soils of the Institute are developed on granite gneiss showing advance stage of weathering. The soil of the plantation region is lateritic type. The total estate of the Institute at Namkum including experimental plantation (about 35 ha) covers an area of 49 ha. The area has ecologically mild salubrious climate, the temperature varying between 26°C (lowest minimum 8.8°C) in December to 43oC (lowest minimum 20°C) in May. The total rainfall during the period was 1629.25 mm of which the monsoon rainfall was 1389.25 mm.

The Present Status

The institute has responded to the opening-up of economic policy & globalisation of industries and agricultural entreprises of the country as well as structural and functional reorganisation of ICAR. The Institute also has undergone a structural change and the priorities have been redefined. The erstwhile Divisions and sections have been abolished and the scientific manpower has now been divided into three divisions, viz., Lac Production, Lac Processing and Product Development and Transfer of Technology. The institute runs three Regional Field Research Stations at M.P, W.Bengal and Orissa. For outstation experiments, areas and trees have been taken on long term lease. Infrastructure development in both physical and manpower has been initiated in a big way. A cell for Agricultural Research Information System (ARIS Cell) has been setup to provide the scientists access to the Super-Information Highway for communication and information retrieval.

Since its inception, the Institute has played significant role in causing awareness among the tribals about the benefit of scientific methods of lac cultivation. The institute has persistently endeavoured to boost, optimise and dissemination of appropriate technologies for scientific methods of lac cultivation and offers packages and practices for all major lac hosts. The Institute has been disseminating these technologies to the growers belonging to weaker sections, who cultivate lac in an area

Meteorological data (Namkum)



encompassing about 80,000 sq.km. covering the states of Bihar, West Bengal, UP, M.P. and Orissa.

The industrial aspects have also not been overlooked. The Institute has always polarised its scientific manpower into the changing demand of the consumer industries. A number of products and processes have been developed. Previously the technologies used to be transferred free of cost to the interested, on request. Now a nominal fee is charged for the transfer of these technologies with the objective of meeting the target set for resource generation by the Council. The Institute has attained international recognition for its contribution in cultivation and utilisation aspects of lac.

The mandate of the Institute are :

- To develop lac culture technologies, adopting existing or genetically improved lac insect and lac hosts
- To develop lac processing techniques for the industry
- To conduct researches for diversification of lac utilisation leading to pilot plant demonstration
- To transfer the technologies to farmers and entrepreneurs
- To act as a repository of information on lac production, processing and utilisation

For Regional Field Research Stations:

- To test the developed lac cultivation technologies under different agro-climatic conditions
- Brood lac production and exploitation of regional hosts
- Training to farmers for boosting lac production in agro-forestry system
- Entrepreneur awareness programme on regional basis

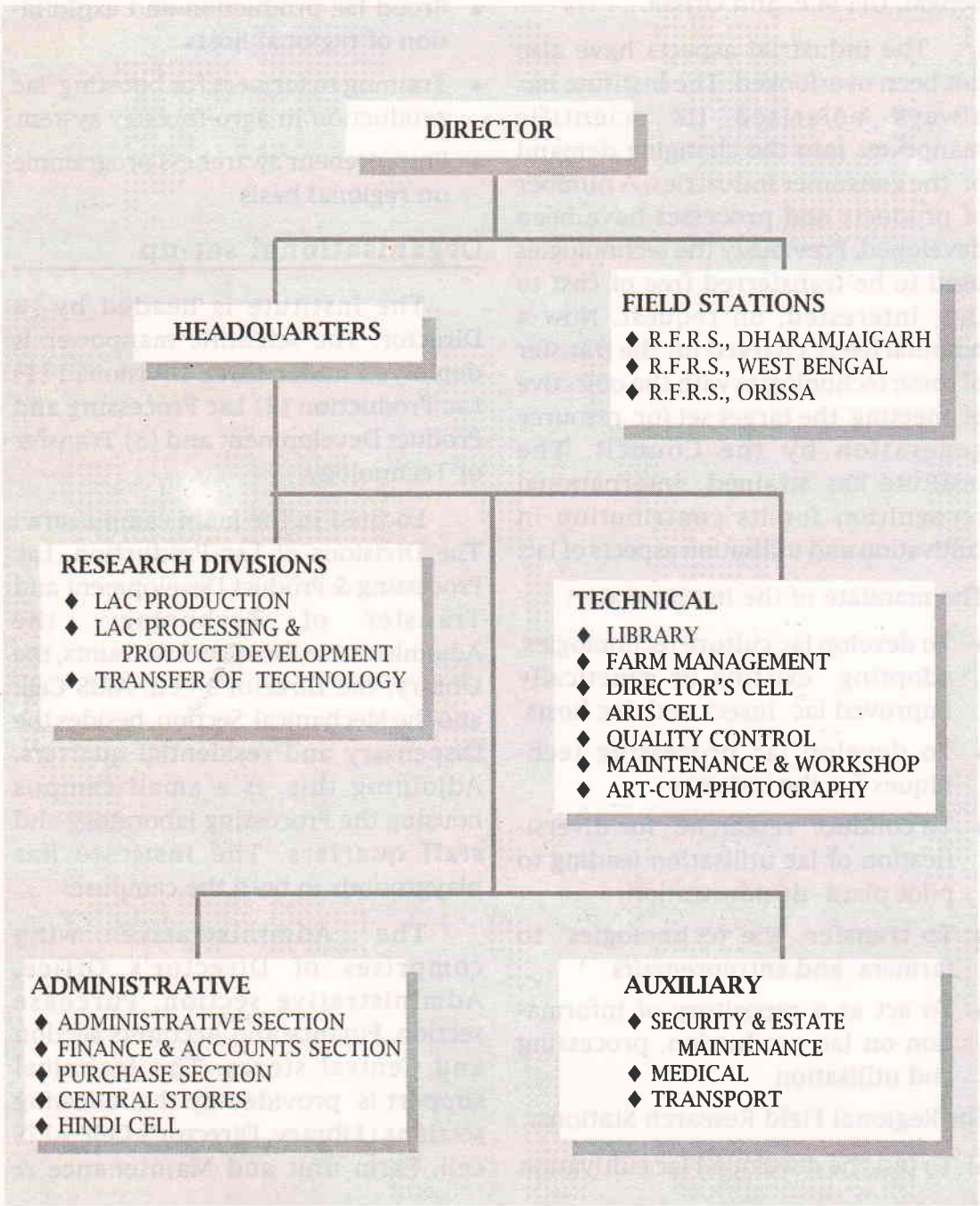
Organisational set-up

The Institute is headed by a Director. The scientific manpower is deplolyed under three Divisions : (1) Lac Production (2) Lac Processing and Product Development and (3) Transfer of Technology.

Located in the main campus are : The Divisions of Lac Production, Lac Processing & Product Development and Transfer of Technology, the Administrative, Finance & Accounts, the Library, the Director's Cell, ARIS Cell, and the Mechanical Section, besides the Dispensary and residential quarters. Adjoining this, is a small campus housing the Processing laboratory and staff quarters. The institute has playgrounds in both the campuses.

The Administrative wing comprises of Director's Office, Administrative section, Purchase section, Finance and Accounts section and Central stores. The technical support is provided by the following sections : Library, Director's Cell, ARIS cell, Farm unit and Maintenance &

ORGANISATIONAL SET-UP OF ILRI



Workshop. The Auxiliary units are : Hindi Cell, Security, Medical and Estate Maintenance services.

Staff

The Institute has a sanctioned strength of 56 scientific, 83 technical, 51 administrative and 110 supporting grade posts.

Budget

During 1997-98, the non-plan expenditure was Rs. 83.43 lakhs, against a budget estimate of Rs. 70.0 lakhs, the plan expenditure was Rs. 342.60 lakhs against a budget estimate of Rs. 205 lakhs. The detailed figures are shown in the table.

Budget of ILRI during 1997-98

Head of accounts	BE (Rs. lakhs)	RE (Rs lakhs)	Actual expenditure (Rs lakhs)
Plan			
Establishment charges	10.00	12.50	12.77
Wages	-	-	-
OTA	-	-	-
T.A.	1.00	1.25	1.01
Other charges including			
Equipments	35.00	37.00	36.09
Works	24.00	34.00	33.56
Total	**70.00**	**84.75**	**83.43**
Non-plan			
Establishment charges	190.00	214.00	206.68
Wages	-	-	-
OTA	0.05	0.05	0.05
T.A.	1.60	2.50	1.77
Other charges including			
Equipments	13.35	35.45	34.11
Totai	**205.00**	**252.00**	**242.61**

RESEARCH ACCOMPLISHMENTS
Lac Production

Improvements in lac cultivation techniques

Cultivation schedules for growing *kusmi* and *rangeeni* crops on *akashmani*

The project was taken up to examine the potentiality of *akashmani* (*Acacia auriculaeformis*) for *rangeeni* and *kusmi* lac crops, individually or in alternation with the conventional hosts, for supplementing lac production. The study included finding out (i) lac potentiality and suitable pruning schedule, (ii) optimum brood requirement for maximising lac yield, (iii) performance of brood from crops raised either continuously on *akashmani* or from conventional hosts, *kusum, palas*, and *ber* and (iv) finally evolving a suitable cultivation schedule based on the above findings.

Lac Potential

Field trials were conducted in RBD during 1990-92 for assessing the potentiality of *akashmani* for raising *kusmi* and *rangeeni* crops by using different brood rates to raise rainy season crops, viz., *katki* and *aghani* and summer season crops, viz., *baisakhi* and *jethwi*. Yield obtained per tree was recorded after harvesting of the crop. Yield ratios in terms of brood lac used and obtained as well as scraped lac of brood lac used and total scraped lac obtained were calculated. Results presented in Fig. 1 show that yields during summer season crops, i.e., *jethwi* and *baisakhi* were found below the level of input used in terms of brood and scraped lac, indicating that *akashmani* is a good host for raising rainy season (*katki*) and rainy season-cum- winter (*aghani*) crops, and not a profitable host for raising only summer season crop. It can be used as an alternative host along with conventional hosts, viz., *kusum* and *palas* for augmenting *kusmi* as well as *rangeeni* lac production.

Pruning Time and Technique

For determination of appropriate method and time of pruning, two methods of pruning, i.e., apical (light and heavy) and basal (heavy) or pollarding were tried during different months of the years 1990-93. Pruning operations were done during December, January, February, March, April, July and October. Total number of buds which appeared after pruning as well as total number of shoots sprouting from the buds were counted. Length of primary, secondary and

tertiary shoots was also measured.

Results show that *akashmani* responded excellently to light as well as heavy methods of pruning. Suitable months for pruning were found to be January, February and July matching well with *kusmi* cycle and December followed by July and October which match with the *rangeeni* crop cycle (Table 1).

Optimum Brood Rate and Age of Shoot for Crop Inoculation

For determination of optimum brood rate and age of shoot for crop inoculation, field trials were conducted during 1991 - 95 on 6, 12, 18 and 24-month-old shoots at different brood rates ranging from 10-30g/metre shoot length for raising *kusmi* (*aghani* and *jethwi*) as well as *rangeeni* (*katki* and *baisakhi*) crops.

Biological parameters, viz., density of larval settlement, sex ratio, fecundity and yield per tree as well as industrial parameters, viz., colour index, life, flow, wax content, bleach index and yield were recorded. Negligible lac yield/tree was obtained from 6-month-old shoots.

Results on yield of rainy season crops are presented in Table 2. Best yields were obtained from 18-month-old shoots. The ratios of brood to brood yield (lac stick) and brood to total yield (in terms of scraped lac) were higher at brood rate of 10-15g/metre shoot length for all ages of shoot.

Field trial for Alternation of Brood Lac

The *kusmi* and *rangeeni* brood lacs obtained from *akashmani* were inoculated on *akashmani* (A x A) and on conventional hosts *kusum* and *palas* (A x K and A x P) of similar inoculable area at similar brood rates. Similarly brood lac of conventional hosts viz., *kusum* and *palas* were inoculated on *akashmani* (K x A and P x A) as well as on the same hosts (K x K and P x P) for comparing the performance of alternation of brood lac. Experiments were conducted for four years (1992-93 to 1995-96). Average of 4 years' results has been presented in Fig 2.

Further, alternation of brood lac from *akashmani* to conventional hosts viz. *palas* and *kusum* and vice-versa was found successful, whereas continuous use of *akashmani* broodlac on *akashmani* led to a gradual decrease in yield in successive years. Yields were higher during first alternation year on conventional hosts. But continuation of the same brood led to gradual decline in yield.

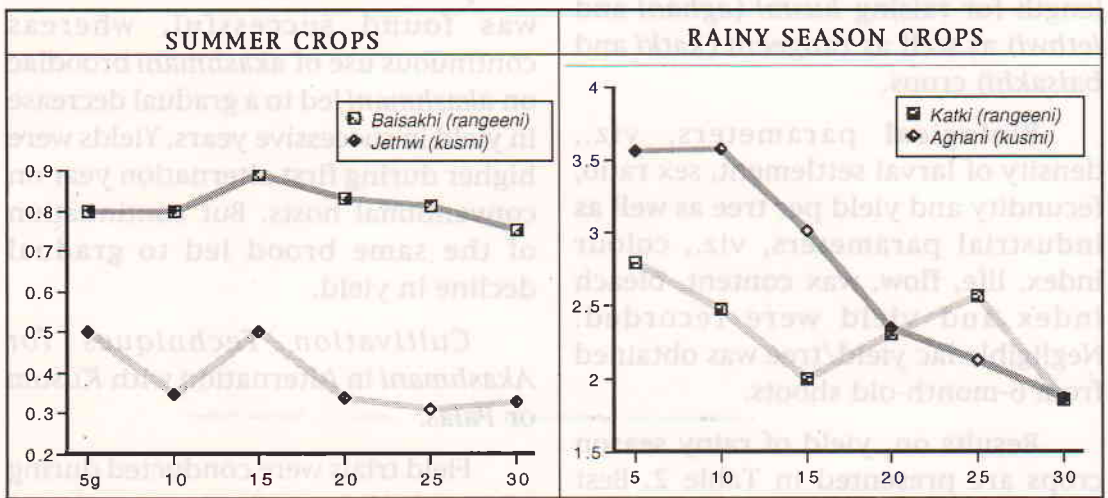
Cultivation Techniques for Akashmani in Alternation with *Kusum* or *Palas*.

Field trials were conducted during 1995-96 and 1996-97 to evolve a suitable cultivation schedules for *akashmani* in alternation with conventional host *kusum* for raising *kusmi* crops and *palas* for raising *rangeeni* crops.

Table 1 Response of different months pruning on *akashmani*

Treatments (Pruning time)	Parameter					
	No. of buds	% mortality of buds.	No. of sprouted shoots	% mortality of shoots	Mean No. of pruned points per tree.	Mean Shoot length/pruned point (m)
December	137.3	14.6	303.3	16.4	7.3	5.4
January	146.7	10.2	319.4	13.3	7.6	6.0
February	149.4	8.3	384.8	9.4	8.3	6.1
March	128.6	31.3	212.6	29.6	6.9	3.9
April	119.8	49.6	142.5	38.7	6.4	2.9
May	108.7	57.6	107.6	48.9	6.6	2.4
July	152.7	7.6	403.7	6.3	7.2	6.4
October	129.5	19.7	282.7	12.7	6.8	5.3

Fig. 1 Yield ratios (Total scraped lac yield/scraped lac from brood used *) of various crops raised on *akashmani*



* Mean of 1990, 1991 & 1992 crops per unit inoculable shoot length

Table 2 Average yield of lac during *katki* and *aghani* crops season on *akashmani*.

Treatments (brood rate g/m shoot)	Age of shoots (months)	Brood used (g)		Yield obtained (g)			Yield ratio	
		Brood lac sticks	Scraped lac	Brood lac sticks	Rejected lac sticks	Total Scraped lac	Brood lac yield/Brood lac used	Total scraped lac yield/Scraped lac from brood used
				Katki				
10	12	533.3	120.01	1176.6	45.0	240.01	2.20	2.0
15		850.0	188.3	2090.0	450.0	426.6	2.45	2.26
20		1016.6	213.3	2153.3	416.6	386.6	2.11	1.81
25		1350.0	28.3	2370.0	516.6	403.3	1.75	2.42
30		1583.3	33.3	2600.0	633.3	470.0	1.64	1.41
10	18	533.3	118.3	1770.0	350.0	336.6	3.31	2.84
15		800.0	165.0	2733.3	400.0	428.3	3.41	2.59
20		1016.6	223.3	3302.6	383.3	650.0	3.24	2.91
25		1350.6	286.6	3433.3	496.6	636.6	2.54	2.22
30		1583.3	326.6	3750.0	486.6	666.6	2.36	2.04
10	24	533.3	123.3	1333.3	383.3	243.3	2.50	1.97
15		800.0	166.6	2070.0	383.3	335.0	2.58	1.01
20		1016.6	223.3	2565.0	400.0	426.6	2.52	1.91
25		1350.3	276.6	2623.3	700.0	496.6	1.94	1.79
30		1583.3	326.6	2563.3	650.0	466.6	1.61	1.42
				Aghani				
10	12	400	118.3	1133.3	300.0	333.3	2.83	2.81
15		600	180	1563.6	386.6	443.3	2.60	2.46
20		800	230	2202.0	446.6	646.6	2.75	2.81
25		1000	285	2306.6	500.0	552.6	2.30	1.93
30		1200	333.3	2360.0	276.6	510.0	1.96	1.53
10	18	533.3	138.3	1880.0	383.3	436.6	3.52	3.15
15		800.0	203.3	2640.0	520.0	618.3	3.30	3.04
20		1066.3	276.6	3550.0	550.1	843.3	3.32	3.04
25		1333.3	340.0	3693.3	580.0	800.0	2.77	2.35
30		1000	390.0	4126.6	653.3	923.3	2.57	2.36
10	24	566.6	148.3	1530.0	383.3	275	2.70	1.85
15		800.0	213.3	2060.0	570.0	420	2.57	1.96
20		1066.6	283.3	2908.3	623.3	640	2.72	2.25
25		1333.3	340.0	3043.3	580.0	670	2.28	1.97
30		1600	386.6	2966.6	716.6	653.3	1.85	1.68

Mean of 1991-92, 1992-93, 1993-94.

Four-coupe lac cultivation technique was followed for both *kusmi* and *rangeeni* strain crops. *Akashmani* trees were divided into 4 coupes, i.e., 2 coupe each for raising *aghani* and *katki* crops; *kusum* and *palas* trees, with similar inoculable area as *akashmani* were similarly divided into 2 coupes each for raising *jethwi* and *baisakhi* crops. The yield results have been summarized in Table 3.

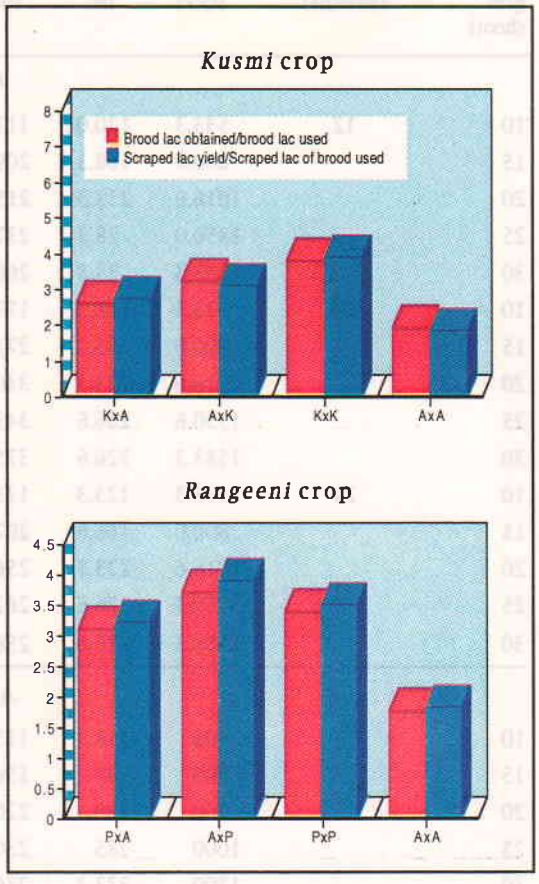
Table 3 Yield of lac crops (*rangeeni* and *kusmi*) on *akashmani* and convèntional hosts, in alternation.

Treatment	Yield ratio	
	Brood lac Obtained/ Used	Scraped lac Yield obtained/ From brood used
Kusmi crops		
K x A (*Aghani*) *	2.17	2.3
A x K (*Jethwi*) **	2.57	2.6
Rangeeni crops		
P x A (*Katki*)#	2.36	2.4
A x P (*Baisakhi*) ##	2.91	3.1

* Mean of *aghani* 95-96 and 96-97.
** Mean of *jethwi* 96 & 97
\# Mean of *katki* 96 & 97.
Baisakhi 95-96 and 96-97.

The results show that the yield ratio is higher during rainy and rainy -cum-winter season crops in comparison to summer season crops, on this host. Operational schedule developed for *kusmi* and *rangeeni* lac production on *akashmani* in alternation with *kusum* and *palas* has been depicted in Tables 4 and 5.

Fig. 2 Yield ratios of lac crops raised by alternation of brood lac between *kusum* or *palas* and *akashmani* (Mean of four years, 1992-93 -1995-96)



Thus, the conventional host indicating that conventional hosts *palas* and *kusum* are suitable for *baisakhi* and *jethwi* crops whereas *akashmani* is a suitable host only for rainy (*katki*) and rainy-cum-winter season crop (*aghani*) in alternation.

❑ The above study has been conclued, The report incorporates summary of findings.

Table 4 Schedule for *kusmi* lac production on *akashmani* in alternation with *kusum*

	Plant density/ha	Akashmani 640		Kusum 16	
	Coupe	A	B	C	D
Operations	Tress/Coupe	320	320	8	8
Pruning		Jan/Feb. (1st Yr.)	Jan/Feb (2nd yr.)	June/July (1st yr.)	June/July (2nd yr.)
Inoculation		June/July (2nd yr.)	June/July (3rd yr.)	Jan/Feb. (2nd yr.)	Jan/Feb. (3rd yr.)
Complete harvesting		Jan/Feb. (3rd yr.) (To-C)	Jan/Feb. (4th yr.) (To-D)	June/July (2nd yr.) (To-A)	June/July (3rd yr.) (To-B)

Integrated pest management schedule to be followed.

Expenditure/ha/annum (Input + interest)	Rs. 22,770
Income/ha/annum	Rs. 65,900
Profit/ha	Rs. 43,130
Capital growth	289%

Table 5 Schedule for *rangeeni* lac production on *akashmani* in alternation with *palas*

	Plant density/ha	Akashmani 640		Kusum 16	
	Coupe	A	B	C	D
Operations	Tress/Coupe	320	320	8	8
Pruning	Oct./Nov. (1st yr.)	Oct./Nov.April (2nd yr.)(2nd yr.)		April (3rd yr.)	
Inoculation		June/July (3rd yr.)	June/July (4th yr.)	Oct/Nov. (2nd yr.)	Oct/Nov. (3rd yr.)
Complete harvesting		Oct/Nov. (3rd yr.) (To-D)	Oct/Nov. (4th yr.) (To-C)	June/July (3rd yr.) (To-A)	June/July (4th yr.) (To-B)

Integrated pest management schedule to be followed.

Expenditure/ha/annum (Input + interest)	Rs. 16,170
Income/ha/annum	Rs. 38,000
Profit/ha	Rs. 21,830
Capital growth	235%

Management practices for *kusmi* lac production on *ber*

Proper Time for Kusmi *Crop Inoculation:*

Aghani and *jethwi* crop inoculations were made, on 12 trees each of *ber*, during different times as given below:

Aghani 1997 II week of June, IV week of June and IV week of July.

Jethwi 1998 II week of November, III week of December and III week of February.

The trees had been pruned in the preceding May.

Emerging brood lac were used for inoculation. Corresponding inoculations were made on same number of *kusum* trees as well.

Observations on the density of larval settlement and percent mortality, scored by destructive sampling method have been presented in Fig. 3.

Effect of Nitrogen and Brood Rates on Yield Parameters of Ber *:*

An experiment was carried out in RBD with four replications. The treatments consisted of eight rates of brood lac with four doses of nitrogen (0, 200, 400g per plant) applied to soil as urea and as foliar spray of 1% urea. The urea was applied in two equal splits during pre, and post, monsoon periods. Length of three shoots randomly marked from each plant were measured before and one month after split application. The results, presented in Table 6, reveal that increase in shoot length was rapid after I split as compared to the II split. The response was highest at the highest dose. This may be ascribed to the coincidence of growth period and better uptake, after the I split.

Fig 3 Larval settlement density and mortality in relation to inoculation time

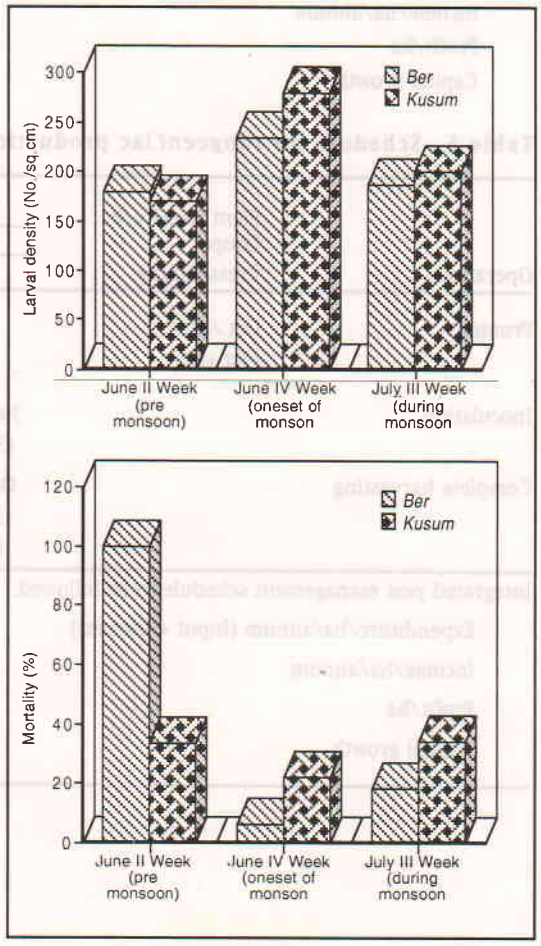


Table 6 Effect of different doses of nitrogen on shoot length of *ber*

Treatment	Percent increase in shoot length		
		After	
	Initial	I split	II split
Urea 400g	35.20	74.60	83.79
Urea 200g	27.70	47.43	53.46
Urea 1% sol.	24.89	59.64	61.93
Control	27.10	25.01	27.10
C.D.	9.64	18.71	22.24

Rangeeni brood and sticklac production on *palas*

Separate experiments were carried out as per the technical programme (Ann. Rep. 1994-95) for the summer *(baisakhi)*, summer-cum-rainy season (*baisakhi-cum-katki)* and rainy season (*katki)* crops on *palas.*

Optimum brood requirement for summer crop(baisakhi *1996-97)*

Two different experiments were continued as per the technical programme mentioned in *Ann. Rep. 1996-97.*

Results of the first experiment showed that a brood rate of 15g per metre shoot length is optimum (Fig. 4). The second trial showed that two sprays of Thiodan + BHC (0.05% each) was highly effective for both brood and sticklac production (Fig. 5).

Optimum brood requirement for Summer-cum-rainy season crop

The crop was raised in Oct. 1996 under brood rates ranging from 5-25g per metre shoot length. A brood rate of 5g per metre shoot length was the best for maximization of yield (Fig. 4).

Optimum brood requirement for rainy season crop

The lac crop was raised under brood rates ranging fom 10-30g. It was found that 15g /m shoot length optimum.

Rangeeni brood and sticklac production on *ber*

Optimum Brood Requirement

Different field trials were carried out in RBD as per the technical programme (*Ann. Rep. 1994-95*) for the summer *(baisakhi)*, summer-cum-rainy season (*baisakhi-cum-katki)* and rainy season (*katki)* crops on *ber.* The results have been summarised below and in Table 6.

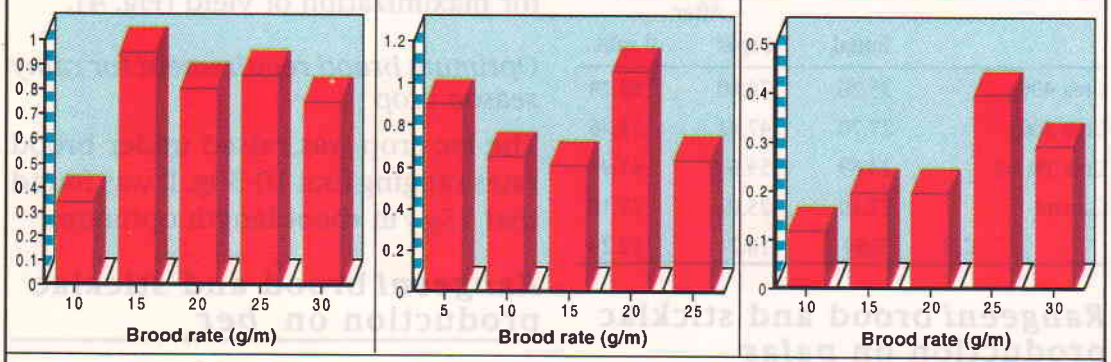
Crop season	Brood rate tried (g/m shoot length)	Best brood rate (g/m shoot length)
Summer *Ari*	10-40	20-25
Summer-cum-rainy season	5-20	5
Rainy season	10-30	10

Pest Control Schedule

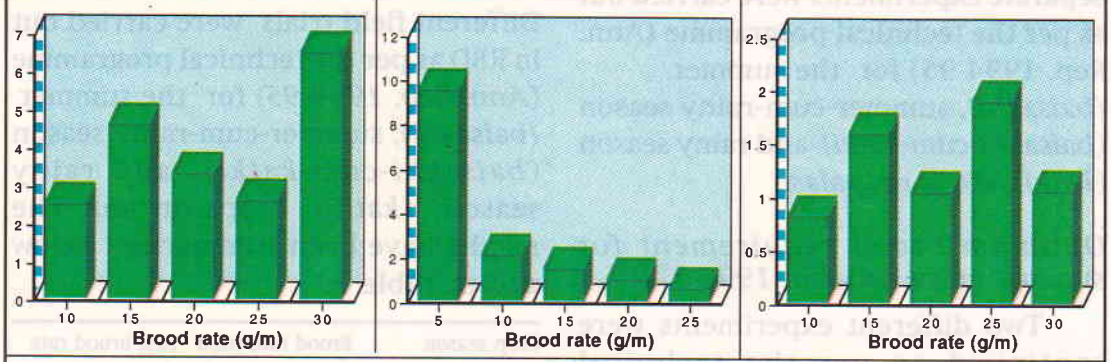
Field trials were conducted in RBD using 10-15 g brood rate. The crop was raised in Oct. 96 and harvested in Jul. 97. The yield per 50m shoot length was computed.

Fig. 4 Yield parameters (per 50m shoot length) of different lac crops on *palas*

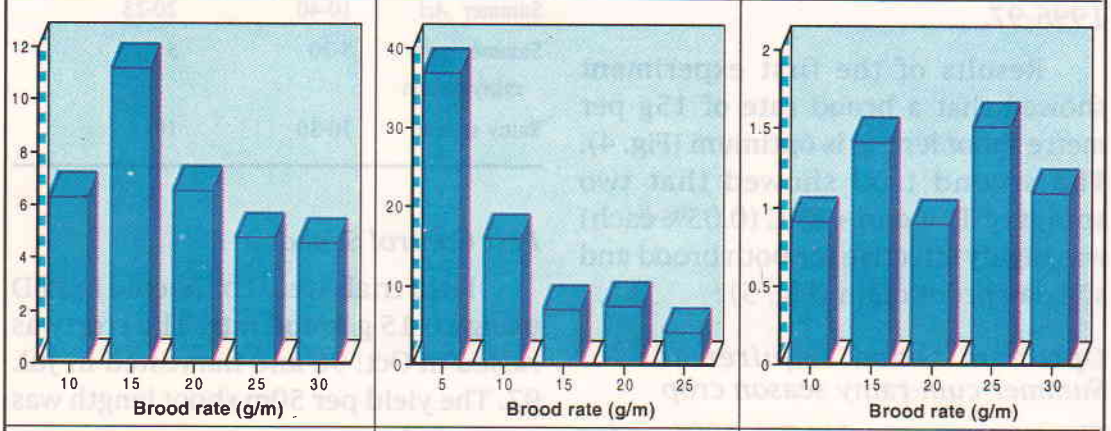
Scraped lac yield (kg)



Yield ratio : brood obtained/brood used

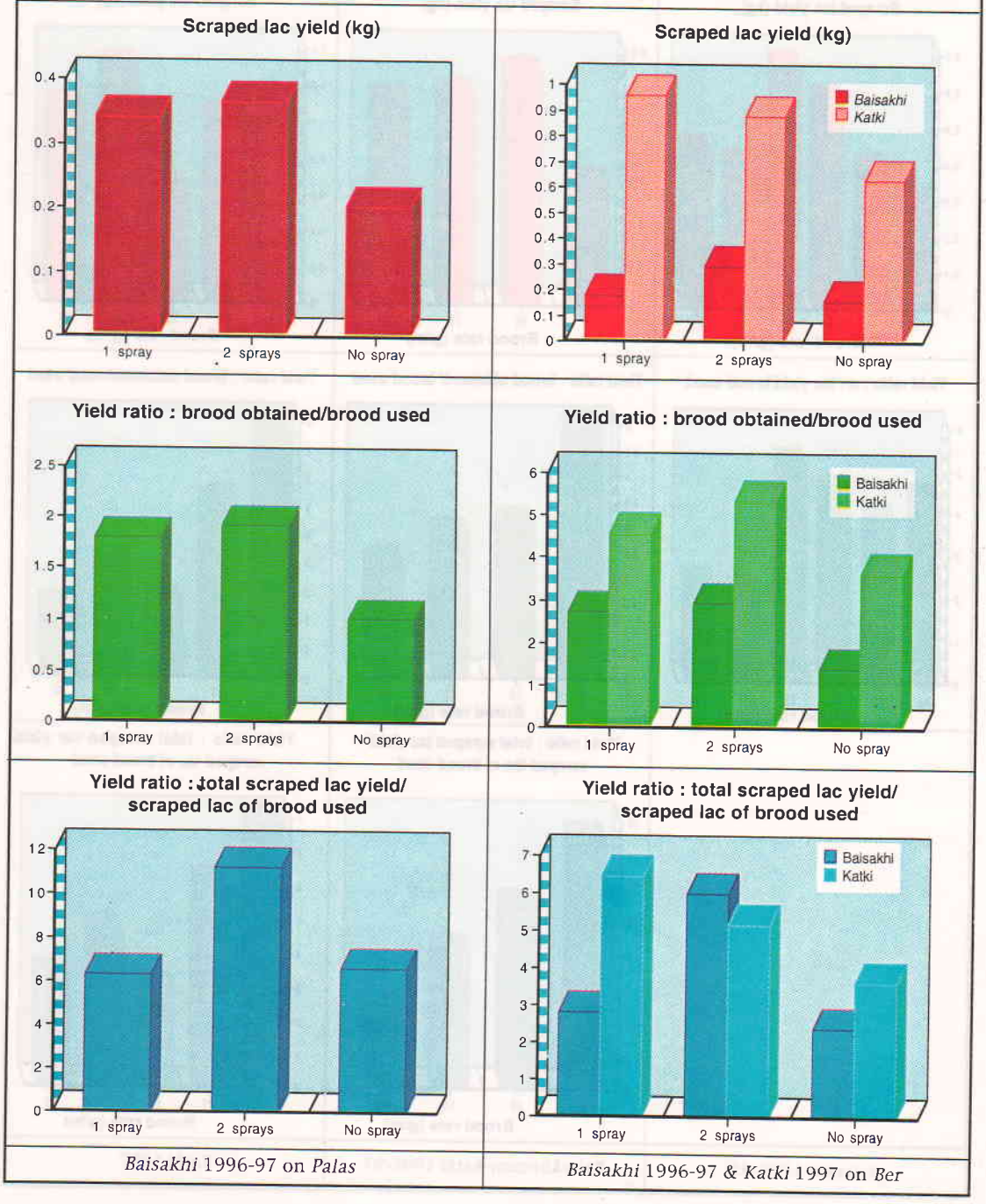


Yield ratio : Total scraped lac yield/scraped lac of brood used



Baisakhi 1996-97 | *Baisakhi*-cum-*Katki* 1996-97 | *Katki* 1996-97

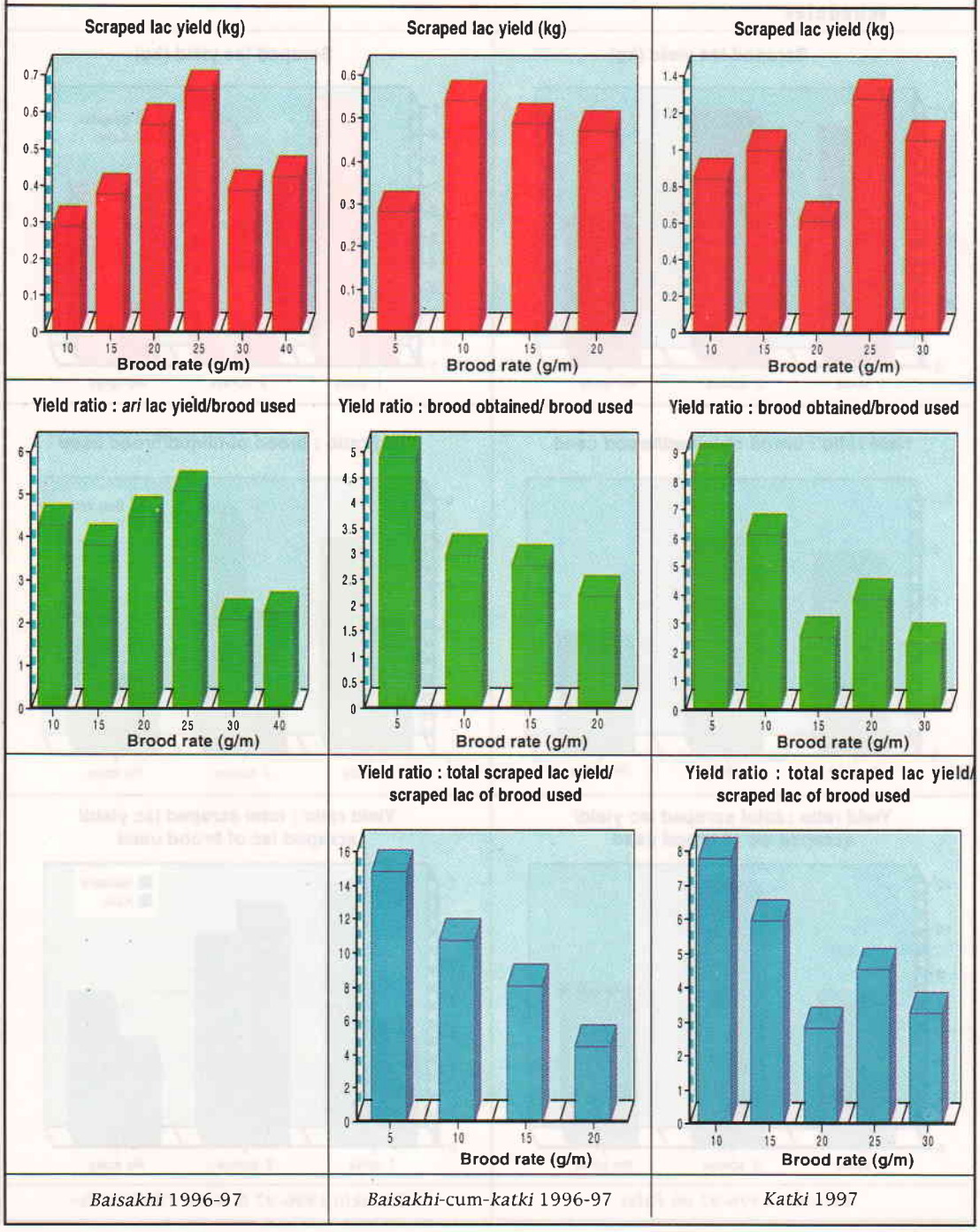
Fig.5 Yield parameters of *rangeeni* crops on *Palas* and *Ber* under different pest control schedules



Baisakhi 1996-97 on *Palas*

Baisakhi 1996-97 & *Katki* 1997 on *Ber*

Fig. 6 Yield parameters (per 50m shoot length) of *rangeeni* lac crops on *ber*



Baisakhi 1996-97 | *Baisakhi*-cum-*katki* 1996-97 | *Katki* 1997

The rainy season (*kakti 1997*)crop was raised at 10-15g/m brood rate. The brood was treated with Thiodan (0.05%) except in control. Trap cropping was done by inoculation of 1/3rd trees heavily (50g/m). Combined spraying of Thiodan and BHC (0.05% each)/ The insecticidal spray was done during Aug. and Sep. The lac yields were computed per 50g shoot length. The results showed that two-sprays of insecticide Thiodan + BHC (0.05% each) gave best yields (Fig. 5).

Lac productivity rating of different lac insects on different hosts

Lac insect stocks were collected from different hosts of sub-humid to humid south-eastern upland (region 5) and humid Bengal and Assam basin (region 2) as given below:

Host	No. of stocks
Palas	4
Ber	1
Kusum	9
Rain tree	4
Lagerstromia	1

The stocks were numbered using four-digit coding developed for this purpose. The first digit indicates agro-ecological region (ICAR), the second digit the host species from which the stock has been collected and the remaining digits, the insect.

The stocks were characterized by I) body width, length and volume, ii) morphology of females and iii)sticklac production per shoot length at the place of occurrence. The productivity-linked traits of eight stocks were evaluated during the rainy season on *Flemingia macrophylla* (Table 7). A highly significant positive correlation was found between cell weight and life period, cell weight and diameter of cell, fecundity and diameter of cell as well as life period and diameter of cell (Table 8).

Performance of lac insect stocks were also compared for density of larval settlement and initial mortality of nymphs on *F. macrophylla*. No correlation between the two traits was found. The genetic co-efficient of variance and heritability in case of the former was estimated to be 16.33 % and 85 % whereas in case of the latter it was 18.27 % and 31.86 % respectively, suggesting independent genetic control of the two productivity linked biological attributes of these insects (Table 9).

The stocks collected so far were found to include *Kerria lacca*, *K. ebranchiata*, *K. albizzae*, *K .fici*, *K..nagoliensis*, and *K.chinensis*. Atleast four stocks appear to be distinctly different from hitherto recorded species of *Kerria*.

Table 7 Mean and correlation coefficient between various productivity linked biological attributes of female lac insects

Characters	Mean	Range
Cell weight	13.6 mg.	6-36 mg.
Fecundity	413.4 nos.	110-902 nos.
Life period	127.0 days	114-179 days
Diameter	4.16 mm	3.10-5.48 mm

	Correlation coefficent		
Character set	Fecundity	Life Period	Diameter
Cell Weight	0.09	0.81**	0.55**
Fecundity	—	0.18	0.35**
Life period	—	—	0.34**

** Significant at 1%.

Table 8 Comparative performance of lac insect stocks with respect to different productivity linked attributes.

Acc.No.	Locality	Host	MLP* in days	Fecundity	Cell Wt. in mg.	RSP** mg./day
LR-5351	Madanpur Madhya Pradesh	*Schleichera oleosa*	144.00	23.23	19.20	0.134
LR-5722	Rairangpur, Orissa	Samanea *saman*	177.16	22.76	12.05	0.103
LR- 5101	Namkum, Bihar	*Butea monosperma*	124.54	17.91	9.35	0.077
LR-5701	Ranchi, Bihar	*Samanea saman*	111.44	20.53	11.35	0.086
LR-5361	Sundargarh Orissa	*Schleichera oleosa*	162.04	18.14	25.90	0.146
LR- 5331	Sarat Orissa	*Schleichera oleosa*	115.14	17.04	9.05	0.078
LR-2761	Amarsi West Bengal	*Samanea saman*	116.00	21.10	11.75	0.101
LR- 5121	Balrampur West Bengal	*Butea monosperma*	118.38	19.95	9.05	0.076
S.Em. ±			5.11	0.69	0.82	0.008
C.D. at 5%			14.75	1.99	2.36	0.024
C.D. at 1%			19.90	2.70	3.18	0.033
Genetic coefficient of variance.			13.43	10.73	44.01	25.159
Heritability in broad sense (h^2)			82.94%	65.95%	91.36	61.384

* Mean life period ; ** Rate of sticklac production

Table 9 : Mean density of settlement and percent initial mortality of young nymphs in various stocks of lac insects

Acc.No.	Locality	Host	Mean Density of settlement (No.)	Mean Initial Percent Mortality
LR-5701	Ranchi, Bihar	*Samanea saman*	57.00 (7.60)	17.50 (24.11)
LR-5131	Silli, Bihar	*Butea monosperma*	88.00 (9.42)	18.25 (25.15)
LR-5902	Jamshed pur, Bihar	*Lagestromea sp.*	93.75 (9.71)	31.36 (33.89)
LR-5722	Rairangpur, Orissa	*Samanea saman*	108.00 (10.44)	42.80 (40.89)
LR- 5101	Namkum, Bihar	*Butea monosperma*	99.75 (9.99)	12.94 (20.56)
LR- 5631	Hata, Bihar	*Albizzia lebbeck*	116.00 (10.81)	32.00 (33.55)
LR- 5121	Balrampur, West Bengal	*Butea monosperma*	75.00 (8.69)	31.00 (33.68)
LR-5351	Madanpur Madhya Pradesh	*Schleichera oleosa*	175.00 (13.27)	36.50 (37.09)
S.Em. ±			0.33	4.16
C.V.			6.60	26.73
C.D. at 5%			0.97	12.20
C.D. at 1%			1..32	16.60
Genetic co-efficient of variance			16.33%	18.27%
h^2 (Heretability in broad sense)			85.96%	31.86%

Trivoltine lac insect on the rain tree (*Samanea saman*)

Only eight stocks were inoculated on seven hosts, under RBD, for studying their preference and performance.

Management of pests of lac insects and host plants

Screening of pesticides against lac insect

The following insecticides/fungicide were screened for their effect in about one-month-old *rangeeni* lac insects on potted *bhalia* plants, during the rainy season generation:

Starthene (Acephate 75% s.p.)	0.00625--0.1%
Amrutguard	0.625--10.0 ml/l
Ovis (fungicide)	0.125--2g/l

Five concentrations of each of the pesticides were tried.

Ovis was found safe to the lac insect at all concentrations. All the concentrations of Starthene and the two highest concentrations of Amrutguard resulted in significantly higher lac insect mortality. The predator population and the lac yield per metre, scored at crop maturity, were not significantly different among various treatments.

Monitoring of pests of lac insects and host plants

Eggs of *Tessaratoma javanica*, a pest of lac host *kusum* , were collected during the severe infestation period, from randomly marked trees. Of them only 25.3% hatched, whereas 12.6%

remained unhatched and 62.1% were found to be parasitized. The parasitoids have been collected and being identified.

Laboratory screening of egg parasitoids against lepidopterous lac predators

Five egg parasitoids obtained from NCBC, Bangalore namely, *Trichogramma brasiliensis, T. chilonis, Trichogrammatoidea bactrae, T. pretiosum* and *Telenomus remus* were screened, for the first time, against eggs of the major lac predators, *Eublemma amabilis* and *Pseudohypatopa pulverea.* The results have been presented in Table 10.

Eublemma amabilis: Maximum parasitisation was recorded with *T. brasiliensis.* No significant difference in the mean per cent egg damaged and corrected inhibition of egg hatching was observed among the treatments. Mean percent emergence of parasitoids has been significantly higher in case of *T. brasiliensis.* Thus, *T. brasiliensis, T. pretiosum* and *T. chilonis* appear to hold promise for the control of this predator.

Pseudohypatopa pulverea: Maximum parasitization was observed in the case of *T. brasiliensis* whereas overall percent inhibition of egg hatching was with *T. pretiosum.* It is interesting to note that all the five tested parasitoids parasitised the eggs of this predator and completed their full life cycle. Thus, all the five parasitoids have been found to hold potential for biological control of this predator.

Rearing of beneficial parasitoids

Larvae of *P. pulverea* were reared on artificial diet. The II and III instar larvae of the predator could be successfully parasitized by *Pristomerus sulci,* under laboratory condition, for the first time. The longevity of the emerging adults varied from 40 to 50 days. this technique can be used for rearing *P.sulci* in the laboratory.

Effect of parasitization on fecundity and resin production in lac insect

Mature lac insect females were collected randomly from lac crops on *palas* and *kusum,* under field conditions. The cells were grouped in unparasitized and parasited and some of the economic parameters of these insects were studied. The results (Table 11) show a marginal reduction in the resin production (~16%) and major reduction (~30%) in the fecundity due to parasitization.

Table 10 Evaluation of egg parasitoids against *Eublemma amabilis* and *Pseudohypatopa pulverea* eggs.

Parasitoid	Mean Percent			
	Parasiti-sation	Eggs damaged	Overall inhibition of egg hatching	Emmergence of adult parasitoids
	Eublemma amabilis			
1. *T. brasiliensis*	43.74* (41.42)**	51.93 (46.07)	95.67 (79.91)	16.09 (23.32)
2. *T. chilonis*	21.49 (26.34)	75.85 (61.87)	97.34 (82.16)	9.61 (13.25)
3. *T. pretiosum*	20.88 (27.14)	64.27 (53.67)	85.15 (70.81)	14.72 (19.82)
4. *T. bactrae*	20.85 (26.69)	73.55 (59.26)	94.40 (76.29)	0.00 (0.57)
5. *Telenomus remus*	7.73 (15.77)	80.09 (63.80)	87.82 (69.82)	0.00 (0.57)
S. Em. ±	3.47	N.S.	N.S.	4.37
C. D. at 5%	10.67			18.83
	Pseudohypatopa pulverea			
1. *T. brasiliensis*	56.73* (48.89)**	14.55 (19.57)	71.28 (57.85)	66.04 (54.78)
2. *T. chilonis*	35.20 (36.05)	9.00 (12.13)	44.20 (41.34)	72.85 (58.62)
3. *T. pretiosum*	46.10 (42.31)	35.89 (36.46)	81.99 (71.96)	75.00 (63.75)
4. *T. bactrae*	34.70 (35.71)	16.59 (17.85)	51.29 (45.66)	51.25 (42.25)
5. *Telenomus remus*	17.56 (18.36)	9.08 (15.28)	26.64 (30.19)	43.75 (37.79)
S. Em. ±	N. S.	N. S.	6.75	N. S.
C. D. at 5%			20.76	

* Data subjected to treatment : Arc. Sine percentage.

** Figures in parentheses are transformed values.

Table 11 Effect of parasitisation on fecundiry and resin production on lac inset during rainy season crop.

Parameters	*Rangeeni*		*Kusmi*	
	Healthy cells	Parasitised cells	Healthy cells	Parasitised cells
Number	59	27	92	34
Diameter (mm)	3.07	3.05	3.49	3.55
Resin weight (mg)	8.83	7.45	17.41	14.31
Fecundity	412	273	384	260

A device for separation of predators, beneficial and inimical parasitoids of lac insect *Kerria lacca* Kerr

A simple device has been developed to separate predators, beneficial and inimical parasitoids of Indian lac insect, *Kerria lacca* (Kerr) by exploiting the size gradient and phototactic nature of adult insects. The used up broodlac or scraped lac harbouring these associated fauna is kept inside a container with a separating unit fitted on, which is able to retrieve beneficial parasitoids namely *Bracon greeni* and *Apanteles tachardiae* to the extent of 75 and 90%, *Pristomerus sulci*, *Brachymeria tachardiae* and *Agathis coryphae* to the extent of 100%, automatically into a chamber from the emerging mixed population of predators, inimical and beneficial parasitoids. These beneficial insects can be released in the field to augment their natural population to act as biological control agent for checking the lac associated predators.

The device consists of (i) a cylindrical opaque plastic pipe (7.0 cm length, 7.5 cm diameter), fitted with a wire net, on one side and open at the other end (ii) another cylindrical opaque plastic tube (chamber I) of slightly smaller diameter which fits smugly into the firs tube and is fitted with a finer wire net, on one end and open at the other (iii) a 250 ml transparent plastic container (Chamber II) which fits into the chamber I. The three components act as a unit, costing Rs 6-7 only. The unit is fitted on one side of locally available empty plastic container of 15 kg capacity for keeping used up broodlac or scraped lac. The total cost of the device including canister does not exceed Rs 50 . The size of container can be changed depending on the quantity of used up broodlac or sticklac to be kept. Accordingly, more than one unit can be fitted to a large container.

Since the device is made up of locally available material, it is very cheap and easy to assemble and does not require any skill to operate. The device may also finds its use in light traps used in monitoring insect population for separating various species of insects according to their size by fitting a funnel of desired size on the top of the container.

Genetics and breeding of lac host plants and insects

Collection and Evaluation of Lac Insect and Host Germplasm

Five new lac insect stocks were collected from Palamau district and added to the existing collection.

Eight lac insect stocks were compared for the biological parameters during the summer season generation. The results have been presented in Table 12 which reveal considerable variation in economic parameters especially fecundity and resin weight.

Plants of *Euphorbia pulcherrima*, a new promising lac host for *rangeeni*, lac were raised through stem cuttings for further studies.

Lac Insect -Host Plant Interaction

An experiment was laid out in a split-plot design, with replications to study the genetic interaction of lac insects with their hosts. Three hosts, namely *F. macrophylla* and *F. semialata* and *Z. mauritiana* were planted as per the layout.

Induction of Polyploidy in Lac Hosts

As a part of the lac host improvement programme, attempt was made to induce polyploidy on *F. semialata*, a bushy lac host. The seeds as well as seedlings were treated with colchicine at 0.25--1.00 percent. The percent reduction in survival in both cases increased with concentration of colchicine and period of treatment. The plants obtained are being evaluated.

Breeding Superior Lac Insects

Crosses were made between different *kusmi* and *rangeeni* lines earlier. The F_1 and F_2 generations of these crosses did not show much variation for the total life period.

Ratio of crimson and yellow female lac insects in the families F_2 and F_3 progenies of *rangeeni* x *kusmi* crosses showed significant deviation from the expected ratio, towards crimson form although the overall ratio was close to the expected ratio.

Segregating progenies of cream mutant and kusmi insects have been raised for further separation of sublines to obtain the desired recombinant insect. A *kusmi* line has been obtained through selection, which matures in April and September.

Table 12 Various biological parameters of different lac insect stocks.

Lac insect stock	Crop period	Life (days)	Fecundity (no.)	Female cell diameter (mm)	Cell weight (mg)	Resin weight (mg)
Rangeeni crimson	(Oct., 96 - June-July 97	257.6	747.6	3.68	16.505	13.438
Rangeeni crimson (inbred)	Oct., 96 - July, 97	267.5	727.8	3.665	15.447	12.808
Rangeeni yellow	Sept., 96 - May, 97	229.6	423.8	3.338	15.377	12.534
Meghalaya	Oct., 96 - May, 97	200.9	392.3	3.138	10.941	8.986
Trivoltine	Oct., 96 - April 97	197.2	285.0	2.74	8.053	6.478
Kusmi crimson (early)	Dec., 96 - July, 97	211.6	468.1	3.302	13.076	10.452
Kusmi crimson (late)	Feb.-Mar., 97 - Jul.-Aug., 97	161.6	516.2	3.496	15.528	13.733
Kusmi Yellow	Nov. 96 - June, 97	201.6	306.8	2.9	8.859	7.083
CV		1.50	22.18	5.86	20.05	21.88
C. D. at 5%		4.19	138.46	0.248	3.36	3.02

Device for separation of lac-associated insects

Propagation and Management of Lac Host Plants

Lac host based agro-forestry cropping model for tarn I (bari) land

This is a new experiment taken up to develop a cropping model incorporating lac hosts, for obtaining maximum biomass and return with minimal inputs.

The experiment was initiated in an area of 0.10 ha consisting of four lac hosts with different habits and root systems. Plants of *Zizyphus mauritiana* (*ber*), *Albizzia lucida* (*galwang*), *Flemingia macrophylla* (*bhalia*), *Flemingia semialata* were planted in the boundary of the plot for lac and fire wood production. *Ber* and *galwang* were planted 3 m apart, whereas the other two hosts, at 1.5 m spacing. In the crop area (main plot), two vegetable crops, sponge gourd (*Luffa cylindrica*) and okra (*Abelmoschus esculentus*) and one cereal crop, *Zea mays* were raised during monsoon season in equal-sized plots (13.0 x 11.5 m). The performance of sponge gourd was better, with an yield of 23.5 Kg/ plot (15.71q /ha) followed by maize which yielded 22.0 kg/plot (cobs) (14.71 q/ha). Mustard has been raised in these two plots after harvesting of the above crops.

Management of *akashmani* for lac cultivation

The study aims at dveloping a suitable technique for quick raising of *akashmani* (*Acacia auriculaeformis*) plantation under rainfed condition. Under this, the effect of plant geometry, and coppicing coupled with fertlizer application, on the plant atttributes as well as lac yields were studied

Effect of Plant Geometry and Fertilizers

The experiment was initiated in 1994. There were three plant geometries (2.0 x 1.8, 3.0 x 2.7 and 4.0 x 3.6m) in the main plot and fertilizer levels (0+0+0, 25+50+10, 50+100+20 and 75+150+30 g/plant of $N+P_2O_5+K_2O$) as sub plot treatments. A split plot design with replications was followed.

Data collected on growth attributes (before raising of jethwi 1997 lac crop) of plants raised in second phase, the harvested biomass and the sticklac yield (*jethwi* 1997) have been presented in Table 13. The plant growth attributes did not differ significantly due to plant geometry. However, they were the best with the application of $50N+100P_2O_5+20K_2O$.

The lac crop (*jethwi* 1997) was raised using brood lac of *F. semialata* and *A. auriculaeformis*. The larval emergence was affected due to bad weather conditions. Lac crop yield was significanly maximum (119.3 g/plant)

at 3.0 x 2.7m spacing and treated with 75N+150P_2O_5+30K_2O g/plant.

Effect of coppicing height and fertilizers

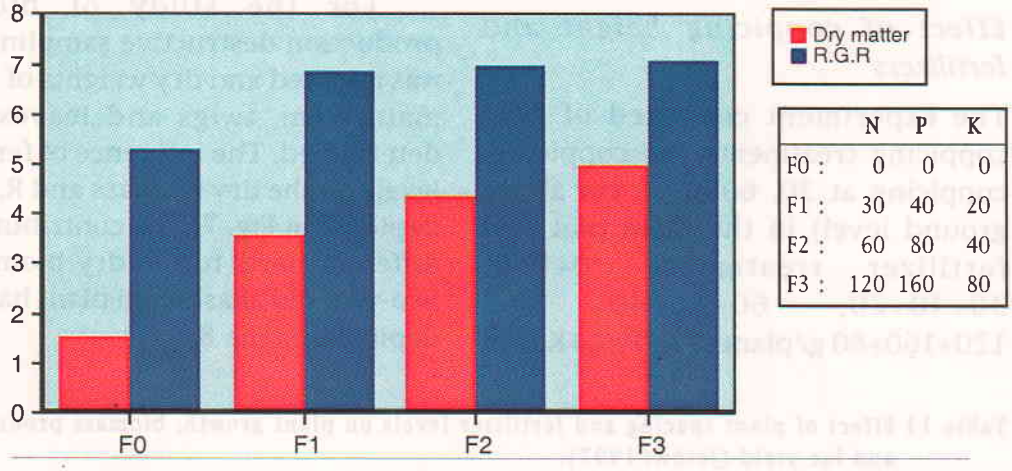
The experiment consisted of four coppicing treatments (no coppicing, coppicing at 30, 60 & 90 cm above ground level) in the main plot and fertilizer treatments (0+0+0, 30+40+20, 60+80+40 and 120+160+80 g/plant of N+P_2O_5+K_2O in the subplots) laid out in a split-plot design, with four replications.

For the study of biomass production destructive sampling plan was adopted and dry weights of roots, main stem, twigs and leaves were determined. The influence of fertilizer levels on the dry biomass and R.G.R. is depicted in Fig. 7. The contribution of different parts to the dry biomass of two-year old akashmani plant has been depicted in Fig. 8.

Table 13 Effect of plant spacing and fertilizer levels on plant growth, biomass production and lac yield (*Jethwi* 1997).

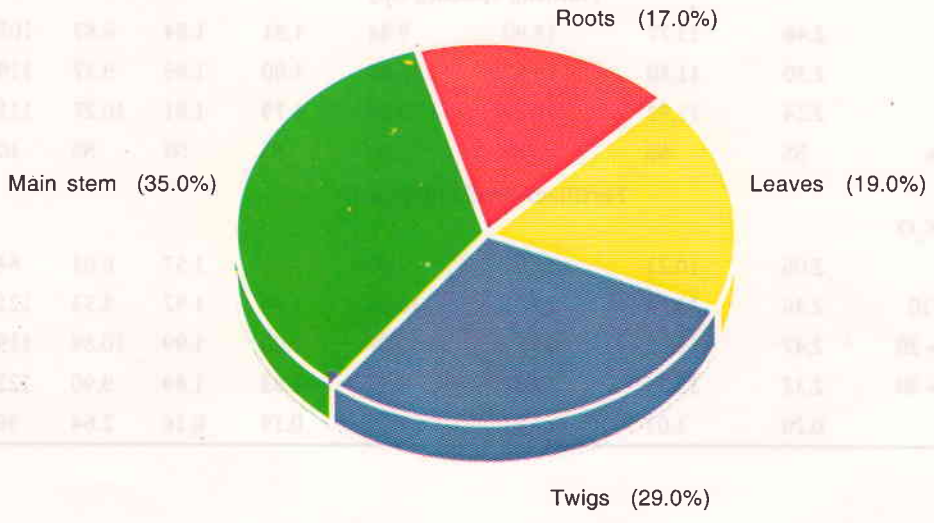
Treatments	Mean plant height (m)	Mean basal girth (cm)	Mean total shoot length (m/plant)	Mean total inoculable (shoot length) (m/plant)	Mean canopy spread (m) N-S	E-W	Mean havested biomass/ (kg)	Stick lac yield/plant (g)
			Planting spacing (m)					
2.0 x 1.8	2.46	13.77	18.90	9.84	1.81	1.84	6.87	105.16
3.0 x 2.7	2.30	11.80	15.87	8.93	1.90	1.89	9.37	119.83
4.0 x 3.6	2.24	11.92	16.37	9.04	1.79	1.81	10.27	111.04
C. D. at 5%	NS	NS	NS	NS	NS	NS	NS	10.70
			Fertilizer levels (g/plant)					
N+P_2O_5+K_2O								
0 + 0 + 0	2.06	10.23	12.02	7.00	1.61	1.57	6.03	84.35
25 + 50 + 10	2.46	13.10	19.07	10.03	1.89	1.92	8.53	121.22
50 + 100 + 20	2.47	13.22	19.77	10.07	2.00	1.99	10.89	119.54
75 + 150 + 30	2.33	13.39	17.37	9.97	1.83	1.89	9.90	122.92
C D at 5%	0.20	1.03	1.37	1.29	0.19	0.16	2.64	36.97

Fig. 7 Dry matter accumulation and R.G.R. in relation to fertilizer level



	N	P	K
F0 :	0	0	0
F1 :	30	40	20
F2 :	60	80	40
F3 :	120	160	80

Fig. 8 Partitioning of different plant components of two-year-old *Akashmani* plant



LAC PROCESSING AND PRODUCT DEVELOPMENT

Improvement in the method of preparation of lac dye and aleuritic acid

Lac dye and aleuritic acid are the two important lac based materials which are in constant demand from the industries. Processes of isolation of these from lac in good yield on technical scale are needed to be perfected at all steps of manufacture.

Lac Dye

The study was taken up with the objective to improve and standardise the existing methods of recovery of lac dye from lac factory waste effluents for industrial use.Lac dye was prepared following the methods developed earlier by Kamath & Potnis (1952) and Ghosh & Sengupta (1977). It was observed that, for large scale preparation, the process requires improvement and optimisation of conditions at various stages.

Selective precipitation of Ca-salt of lac dye was achieved by acidifying the sticklac wash- water with 10% sulphuric acid and then suitably adjusting the pH of the solution. Calcium hydroxide was found more efficient than calcium carbonate for precipitation of Ca-salt of dye. This method opens up the possibility of segregating other dissolved materials from lac dye and resulting in a purer product. Dyeing trials with the Ca-salt of lac dye using different mordants on wool gave satisfactory results.

The lac dye (tech. grade) was then generated from its calcium salt taken in aqueous solution and treating with hydrochloric acid. The precipitated lac dye was allowed to settle, filtered, washed and dried. It resulted in lac dye having dye content 85% in nearly 50% yield on the wt. of Ca-salt of dye taken. The mother liquor left behind was recycled for generation of lac dye from the next batch of Ca-salt of lac dye. Although the yield increased to 55% on the wt. of Ca-salt of dye but the dye content decreased to 68%.

Attempts were made to purify the lac dye (dye content 68%). The yield of pure lac dye (90%) was found to be 40% on the wt. of crude lac dye. Optimum conditions (solid content and temperature) for crystallisation of lac dye were determined. The solubility of pure lac dye in water was found to be 0.8% at 30 ± 5 °C.

A method based on spectrophotometric absorbance measurements, was developed for the estimation of dye content in lac dye samples. The method involves

measurement of absorbance of a dye solution of known concentration at wavelenth of 490 nm. The dye content is then determined from a calibration curve taking into account the dilution factor. The dye content (Ca-salt) in 100g of sticklac from different lac hosts e.g., *palas, kusum* and *ber* were determined using the above method and also gravimetrically. The results are summarised in the table below :

Sample	Dye content by absorbance measurement (%)	Dye content determined gravimetrically(%)
Palas (phunki)	0.4	0.39
Kusmi (phunki)	0.54	0.68
Ber (ari)	-	0.9

Aleuritic Acid

From seedlac : This study has been taken up to optimise conditions for industrial scale isolation of aleuritic acid from sticklac, seedlac and *kiri.*

Studies were made to optimise conditions for (i) removal of wax and (ii) period of hydrolysis of seedlac for better filtration rate. Aleuritic acid was isolated from seedlac by alkaline hydrolysis followed by removal of wax and other insolubles from precipitated sodium aleuritate before decomposition by an acid. An improvement in the yield of aleuritic acid (nearly 25%) was obtained as compared to existing method (18-20%) maintaining the period of hydrolysis, 10 days.

It was observed that in case of 3 and 5 year old samples complete hydrolysis was achieved within the same period as for fresh samples, but older samples (7 and 10 years old) required prolonged warming at water bath temp. for complete dissolution in sodium hydroxide solution. Moreover, hydrolysis had to be continued upto 15 days instead of normal 10 days for full recovery of sodium aleuritate. The yield of crude aleuritic acid was approx. 25% in each case.

Purification of crude aleuritic acid was carried out with different solvents viz., (a) ethyl acetate (b) methanol (c) ethanol and (d) water, in the presence of a decolourising agent. Experiments were carried out by varying the proportions of solvent and activated charcoal. The conditions were optimised wherein an yield of 70-75% pure aleuritic acid on the wt. of crude one, was obtained in case of solvents (a), (b) & (c) but only 5-7% yield was obtained for (d). The m.p.s. of the corresponding aleuritic acids obtained were 95-96, 98-99, 99 and 100-101°C respectively.

From *kiri* : Experiments were also carried out for recovery of aleuritic acid from *kiri* — a major by product of lac industry containing approximately 30% resin. The method has been improved and standardised by optimising the conditions of hydrolysis of *kiri* with lime,

decomposition with an acid and finally precipitation of aleuritic acid. This resulted in recovery of pure aleuritic acid, m.p. 98-99 °C, in an average yield of 11% on the resin content in *kiri*.

Recovery of aleuritic acid directly from sticklac (*kusmi*, resin content 75%), following the same method as described above for seedlac, was tried. The yield was 12% on the weight of sticklac.

Syntheses of some bioactive compounds from aleuritic acid

(Z)-9-hexadecen-1-ol and its acetate

Pheromones are behaviour modifying chemicals released by insect to communicate between members of the same species. Synthetic pheromones are being widely used because of their considerable potential in Integrated Pest Management (IPM).

The sex pheromones of certain noctuid moths contain (Z)-9-hexadecen-1-ol and its acetate as components. Both the compounds are present in the sex pheromone of *Heliothis subflexa* (Gn) while the latter is present in those of *Mamestra brassicae* L., *Pseudalatia unipuncta* and *Naranga aenescens* M. (rice green caterpillar).

The present work was taken up to develop simple methods of synthesis of the above compounds using aleuritic acid as starting material.

The *threo*-aleuritic acid, isolated from shellac after alkaline hydrolysis, was converted into its *erythro*-isomer before proceeding to the synthetic sequence.

Treatment of *erythro*-aleuritic acid with ethylorthoformate/benzoic acid followed by saponification of the product with aq. alc. alkali and subsequent acidification, afforded 16-hydroxy-(Z)-9-hexadecenoic acid as a liquid.

The target compound (*Z*)-9-hexadecen-1-ol was achieved by esterification of the above unsaturated acid with $MeOH/H_2SO_4$ followed by mesylation with methane sulphonyl chloride and reduction of the mesyl derivative with LAH/THF. The acetate derivative was prepared following pyridine-acetic anhydride method. Further identification of the compounds is in progress. Synthesis of more insect sex pheromones such as hexalure (*Z*)-7-hexadecenyl acetate from aleuritic acid is under progress.

Polyblends of shellac with synthetic resins/ polymers

Polyblends are physical mixture of two or more structurally different homo - or copolymers and are well established materials for the polymer industry. Shellac, having pendent polar groups, has enormous potential to be compatible with polar polymers. In such blends there is good scope for

imparting some of shellac's excellent properties, e.g., adhesion to a variety of substrates, unique film forming capability, resistance to hydrocarbon solvents, good scratch hardness, excellent dielectric strength, excellent stability towards u.v. radiation to selected polymers in order to yield new products of commercial importance. The objectives of the present study are (I) to identify polymers/resins with which blends can be formed, (ii) to develop artefacts based on shellac, (iii) to identify polymers for which shellac can be used as extender and (iv) to suggest fields of applications of shellac based polyblends.

A baking-type high thermal resistant shellac based insulating varnish

Low thermal resistance and poor flexibility are the two main weaknesses of shellac which limit wider application of shellac in electrical industry. A baking type insulating varnish has been developed based on a blend of shellac and a synthetic resin in commonly used solvents. Films of the varnish possess adequate dielectric strength (62-72 kV/mm), flexibility, resistance to transformer oil and increased resistance towards tracking when tested as per IS:10026-1982. The films also possess thermal resistance upto 200-220°C.

Melting behaviour of lac

As a preliminary to the study of shellac-polymer/resin blends, thermal behaviour of different forms of lac was studied employing a Differential Scanning Calorimeter.

Study of melting of lac resin (sticklac, seedlac or shellac) has revealed that the melting is a two-step process, the resin portion giving a peak around 55-57 °C and the wax portion accounting for the peak around 72-74 °C. The onset of melting takes place around 52-54 °C. Conventional method, however, gives single melting temperature around 65-75 °C.

Dewaxed lac/bleached lac (dewaxed) gives only one peak around that of the resinous portion. An inspection of the melting profile of lac will thus, reveal presence or absence of wax in it, providing a quick method for ascertaining the presence of wax in it.

From a comparative study of the melting profiles of heat polymerised lac and polymerised lac due to storage, it has been confirmed that shellac is not a truely thermosetting resin. While polymerised lac due to storage (more than 13 year old) did not show any melting of the resin, heat polymerised lac (heated at 150 °C for more than 1h above HPT), on the otherhand, showed presence of some quantity of uncross-linked resin.

Development of lac based wood and metal lacquer

Studies on the development of lac varnish for wood were undertaken with

a view to ascertain technological gaps, if any, in the composition of "Melfolac" (a heat and water proof french polish based on dewaxed lac and butylated melamine resin) developed by previous workers. A comparative study was undertaken on the performance of freshly prepared Melfolac vis-a-vis two commercial products available in the market.

The drying characteristics of the varnishes on metal, glass and wooden surfaces were first studied (Table 14). It was observed that Melfolac dried faster than similar commercial products.

All the varnishes passed the heat resistance (steel beaker having boiling water in it) test. The films of the products also passed the flexibility test (on conical mandrel) and water resistance test (upto 24h). Further study is in progress.

Table 14 Drying times of Melfolac and two similar commercial products, on wood

Samples	Touch Dry Time (h)	Hard Dry Time (h)
Melfolac	0.5	5.0
Commercial product A	12.0	24.0
Commercial product B	9.0	24.0

TECHNOLOGY TRANSFERRED

Process and Product Demonstration

Technical know-hows for lac based processes/ products were transferred through process/product demonstration programme (Table 15). A revenue of Rs 53,000 was earned under this programme.

Consultancy

Procedure for the synthesis of isoambrettolide (9-hexadecenolide) used as a fixative in the perfumery industry has been supplied to M/s FFC Aromas Pvt. Ltd., Mumbai under MoU. A revenue of Rs 50,000 was earned.

Table 15 Details of entrepreneur development programme on lac-based processes/products

PRODUCT/PROCESS	No. TRAINED	BENEFICIARY	PERIOD
Aleuritic acid	1	Sri Gatkal Sanjay Karbhari FFC Aromas Pvt. Ltd. Mumbai-400 084, Maharashtra	14 — 29.7.97
Testing & Analysis of lac	1	Md Shahzad Daltonganj, Dist.- Palamau, Bihar	29 — 23.8.97
Dewaxed bleached lac	2	Sri Sunil Kumar Agarwal Shinghania Lakh Industries , Bilaspur 495 445, Madhya Pradesh	9 — 19.9.97
		Shri Ranjan Kumar Sahoo, M/s Gupta Bros. (Shellac) Bundu, Ranchi, Bihar	21 — 29.11.97
Lac dye	1	Sri Rakesh Kumar Agarwal M/S Ganga Lakh Udyog, Daltonganj, Bihar	6 — 14.10.97
Shellac Gasket Compound	1	Sri Bijoy Kumar Bhattacharya Purulia, West Bengal	15 — 18.10.97
Melfolac	3	Sri Govind Bajaj, Bajaj Chemical Industries Gondia, Madhya Pradesh	17 — 22/11/97
		Sri V.H. Krishna Srikakulam , Andhra Pradesh	17 — 22.11.97
		Mr Deepak Jayaswal Indian Shellac Trading Company Indore, Madhya Pradesh	27 — 6.12.97

EDUCATION AND TRAINING

The Division of Transfer of Technology conducts short and long-term training programmes on lac culture, processing and products based on lac with the active cooperation of other Divisions and Sections of the Institute.

The Institute conducts certificate course on Modern Methods of Lac Culture (4 months). One person successfully completed the course during April - August, 1997 session.

Training of farmers

The Institute also conducts one - day and one week training programmes on lac, with special emphasis on lac culture. These programmes mainly aim at educating the lac cultivators and others on the improved lac cultivation techniques. A summary of one-week programmes conducted during the period is furnished in Table 16.

Table 16 Details of one-week training programme on "Lac culture and other aspects"

Sponsoring organisation	Period	Beneficiary	No. of participants
CASA Resource Centre Riskpur, Dumka	2-7.6.97	Farmers	14
DULAL, Baripada, Orissa	-do-	-do-	5
INDALCO, Chotamuri	-do-	-do-	1
Private	-do-	-do-	2
CASA Resource Centre Bichna, Khunti (Ranchi)	10-15.11.97	-do-	14
SAGEN, Orissa	-do-	-do-	5
		Total	41

Late Sri A. K. Dasgupta, Scientist (Sr. Scale) explaining the trainees about French polish preparation

One-day education programme on lac

One-day-lac programmes on cultivation were organised for 47 batches of Farmers/Students/Forest Officers as per details given in Table 17.

Keeping in mind the demand from the farmers for "On-farm training" a number of training camps on lac culture were organised in association with various NGOs as given in Table 18 .

Farmer Adoption

A farmer, Sri Raj Kumar Sahu of Jirawar village, Ormanjhi Block, Ranchi district was adopted during 1996-97 for his economic upliftment through lac cultivation he could produce more than 4 quintals of broodlac from *baisakhi* and *katki* crops.

Participation in *Kisan Goshthi* etc.

Information dissemination camp was organised at Khunti on lac culture and lac-based cottage industry under the sponsorship of Nav Bharat Jagriti Manch, in which more then 100 farmers participated. An Ex-trainees' Sammelan organised on 10.09.97 by R.K. Mission, Ranchi at Morabadi and another on 07.02.97 at R.K. Mission, Getalsud Farm in Angara Block were attended by the experts of the Institute. A work-shop on "Development of rural women and children" for promoting utilisation of lac in cottage industries was attended by the experts of the Institute, at Garhwa.

Scientist of the institute discussing with the adopted farmer about lac crop condition on *palas*

Table 17 Details of one-day education programme on lac

Beneficiary	Sponsored by	No. of batches	No. of participants
Farmers	Divyayan KVK of RK Mission, Morabadi	6	249
	Society for Rural industrialisation	2	40
	Total	8	289
College/School Students	Forestry College, B.A.U., Ranchi	1	18
	Agriculture College, B.A.U, Ranchi	1	40
	Marwari College, Ranchi University, Ranchi	1	22
	Narsinha Dutt College, Howrah, West Bengal	1	14
	Xavier Institute of Social Service, Ranchi	1	64
	Kendriya Vidyalay, Dhurwa, Ranchi	2	89
	Total	7	247
Senior Forest Officers	Forest Department	1	16
Trainees of extension	Divyayan KVK, Ranchi	12	641
	Society for Rural Industrialisation, Ranchi	1	36
	Nav Bharat Jagriti Manch, Khunti	3	66
	Total	17	759
	Grand total	32	1295

Table 18 Details of on-farm training for farmers conducted by the Institute

Village	Block	Purpose	Collaborating organisation	No. of participants
Sarwada	Murhu	Improved technique of lac cultivation	XISS, Ranchi	26
Dolda	Murhu	-do-	XISS, Ranchi	36
Seadih	Seadih	-do-	XISS, Ranchi	46
Kocho	Silli	Pruning demonstration	INDALCO Chotamuri	15
Kocho	Silli	Estimation of brood requirement, crop yield	INDALCO Chotamuri	20
Kocho	Silli	Demonstration for inoculation	INDALCO Chotamuri	100
Kocho	Silli	Demonstration of pesticide spray on lac culture	INDALCO Chotamuri	8
Mahatamara	Jhalda	-do-	INDALCO Chotamuri	
			Private	15
			Total	266

Field Demonstration

Eight field demonstrations of various lac operations were organised for farmers of 22 villages in collaboration with XISS, Ranchi and INDALCO, Chotamuri. 251 farmers were benefited from this programme. One demonstration on control of enemy insects was given on farmer's field at Mahatamara (Jhalda) village Fifteen farmers participated in the programme Table 18.

Technical advice

An entrepreneur, Mr Ajay Kumar of Bokaro, interested in large-scale cultivation of lac was technically guided in respect of survey of area, selection of *palas* trees to be utilized, with the help of institute's experts. Finally, three patches consisting of 5,000-10,000 palas trees were selected and inoculations made to initiate lac culture.

Linkages

An MoU was signed between Birsa Agricultural University, Ranchi and Indian Lac Research Institute for inclusion of lac culture and other related aspects in B.Sc. (Ag) syllabus. Under this agreement both the institutions will collaborate in areas of research and extension. The Institute is also in the process of establishing linkages with a number of organisations for taking up programmes to strengthen lac production and industry. A programme is being finalised for integrated rural development, in corporating lac culture, in a cluster of villages in collaboration with XISS, Ranchi. Similarly, linkages are being established with other agencies like INDALCO Chotamuri, Sunita Kala Niketan, Gumla and Small Industries Development Bank of India, Patna for various extension activities.

Quality control and certification

The institute also houses an internationally recognised testing laboratory for quality certification of lac and lac products. The details of the testing activities during the reported period are given below:

Number of samples received	=	197
No. of tests carried out	=	283
Amount of revenue earned	=	Rs.21,795

PUBLICITY

Publicity Through Mass Media

Popularisation of lac culture technique was also done through mass media. The radio talks delivered by the experts of the Institute in the *Kheti bari* programme at AIR, Ranchi have been furnished in below :

Topic	Speaker	Date of broadcast
Miscellaneous uses of lac	Dr S.C. Agarwal	15.05.97
Lakh keet palan ke poshak vriksh evam unki dekh rekh	Dr B. P. Singh	18.05.97
Lakh keeton ko unke shatru keeton se kaise bachaye	Dr A. Bhattacharya	25.05.97
Lah palakon ko sarkar se milne vali suvidhayen	Mr R.Ramani	27.06.97
Lakh utpadan kshetra mein vipanan adi samasyaen evum nidan upay	Dr S.K. Saha	23.08.97
Lakh keet palan se adhik labh kaise lein	Dr S.C. Agarwal	13.12.97
Radio paricharcha	Dr A.K.Jaiswal	05.12.97

Various activities and functions of the Institute were given wide publicity through local and regional news papers regularly to create mass awareness among the public about the role of the Institute. During the period news items were published in different news papers, on the Institute's activities.

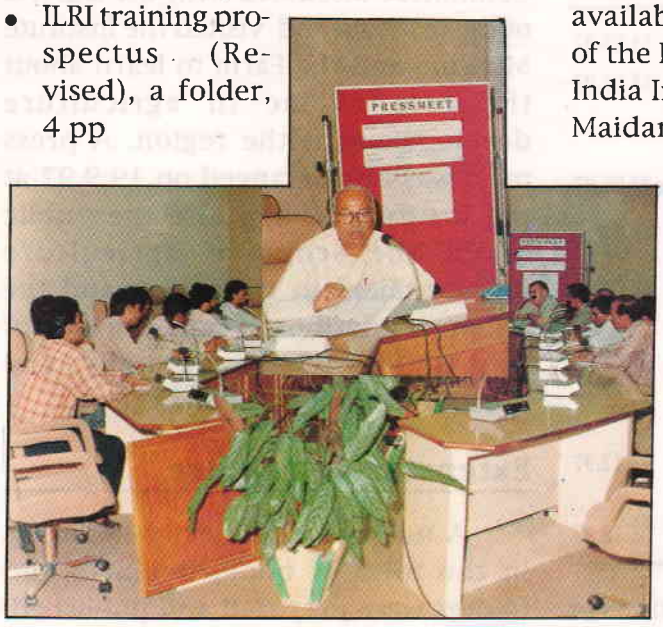
A Special committee for Technology Transfer on Agricultural Development constituted by Ministry of Agriculture under the chairmanship of Sri DP Yadav, former Central Minister visited Ranchi and was hosted by the Institute. Other members of the Committee were Smt. Rita Sharma, Joint Secretary, Ministry of Agriculture and Shri Sita Ram Yadav. The Committee discussed with the experts of the institute and visited the Institute Museum and the Farm to learn about the role of lac in agriculture development of the region. A press meet was also arranged on 19.9.97 at the Institute to appraise the public about the scope of agriculture developement in the region and the recommendations emanating out of the deliberations held by the Committee with various groups.

Extension Literature

A number of publicity materials in the form of book, booklets and folders were prepared and published. These were :

- Proceedings of the seminar of Lac Industry - Challenges and Solutions, a book, 130 pp
- Vision 2020 - ILRI Perspective Plan, a booklet, 38 pp

- Souvenir-Symposium on Bio-resources of Chhotanagpur and Their Industrial Significance, a booklet, 34 pp
- ILRI News letter, Jan - Mar 1997, 4 pp
- Circular and Registration Form for Symposium on Strategies for Promotion of Lac Consumption, May 14 - 15, 1998, a folder, 6 pp
- Lac dye - a folder
- ILRI News letter, April - June, 1997, 4 pp
- ILRI training prospectus (Revised), a folder, 4 pp



- *Palas tatha ber par lakh ki kheti*, a folder in Hindi, 4 pp
- *Aaiye seekhe unnat vidhi se lakh ki kheti*, a folder in Hindi, 4 pp
- *Kusum vrikshon ki kaat - chhant avum dekh - rekh*, a pamphlet in Hindi, 1 p
- *Muhar lagane ki lakh* - a pamphlet in Hindi, 1 p

Participation in Exhibition, *Kisan Mela* etc.

The Institute participated in a *kisan mela* organised by Sai Sewa Mission, Ranchi at Sai Gram (Sarsa), Lapung (Ranchi). It also put up a stall depicting lac culture, processing and utilisation as well as technologies available and the training programme of the Institute in the Bihar Pavilion of India International Trade Fair, Pragati Maidan, New Delhi.

Technical Information Services

Technical information, in respect of lac culture, lac process/product and other general information related to lac were provided to interested persons including the lac growers/entrepreneurs/other agencies. More than 72 querries were attended to during the period. Lac culture samples received from lac growers and other organisations were examined for forecasting the time of crawler emergence and causes of lac insect mortality.

PUBLICATIONS

Research Papers

1. Agarwal, S.C. (1997) Lac- as a natural dye, The Indian Text. J., July issue, 26
2. Bhattacharya, A, Jaiswal, A.K., Sharma, K.K., Mishra, Y.D. and Chandrika, P. (1997) Evaluation of diflubenzuron (Dimilin 25 WP) on *Eublema amabilis* (Lepidoptera : Noctuidae)- a predator of lac insect, J.ent. Res., 21(4), 365
3. Goswami, D.N., Majee, R.N., Saha, S.K. and Agarwal, S.C. (1997) Characterisation of *threo*-aleuritic acid and its derivative by Differential Scanning Calorimetry, J. Inst. Chem. (India), 69 (Part 1), 12
4. Majee, R.N., Saha, S.K. and Agarwal, S.C. (1997) Ferric Chloride, a esterification catalyst for aleuritic acid derivatives, J. Inst. Chem. (India), 69 (Part 5), 137
5. Majee, R.N. and Ramani, R. (1997) Synthesis of (Z)-7- tetradecen-1-yl acetate and (Z)-9-tetradecen-1-ol and its acetate from aleuritic acid, J. Indian Chem. Soc., 74, 727
6. Mishra, Y.D., Sushil S.N., Sharma, K.K., Bhattacharya, A. and Jaiswal, A.K. (1996) Effficiency of selected organophosphorous insecticides for control of *Chrysopa madestes* (Neuroptera : Chrysopidae) - a serious sporadic predator of Indian lac insect, *Kerria lacca* (Kerr), New Agriculturist, 7(I), 17
7. Mishra, Y.D., Bhattacharya, A. and Sushil, S.N., (1997) Effect of some systemic fungicides on the nymphs of Indian lac insect, *Kerria lacca* (Kerr) for their protection against fungal infection, J. ent. Res., 21(3), 291
8. Saha, S.K., Goswami, D.N. and Srivastava, B.C. (1997) Technology for the lac product sector in the "Proceedings of the National Seminar - Lac Industry - Challenges and Solutions", Indian Lac Research Institute, Ranchi, p. 89
9. Sarkar, P.C. and Agarwal, S.C. (1997) Functional transformation of (±) *threo*-aleuritic acid synthesis of 5-methyl tetrazoles, J. Indian Chem. Soc., 74,646
10. Sharma, K.K. (1997) Occurrence of lac insect on *Thevetia peruviana* (Pers.) Merrill, Insect Environ, 3(2),29
11. Sharma, K.K. and Ramani, R. (1997) Suitability of fruits of pumpkin (*Cucurbita moschata* Duchesne ex. Poir) for laboratory rearing of two strains of Indian lac insect, *Kerria lacca* (Kerr) (Coccoidea:Tachardiidae), J. ent. Res., 21(2), 169

12. Sushil, S.N. Mishra, Y.D., Bhattacharya, A., Jaiswal, A.K. and Sharma, K.K.(1997) Safety of endosulfan and dichlorvos to four parasitoids of lac insect predators, Pest Management in Horticultural Ecosystems, 3(1), 39

Papers presented in Seminars

1. Agarwal, S.C. (1997) Lac culture as a tool for revival of tribal economy, presented in a refresher cource on ". Advances in Forestry at B.A.U., Kanke, Ranchi.
2. Agarwal, S.C. (1997) Role of lac culture in environment and nature conservation, presented in an Army Environment and Nature Conservation Workshop held at Ranchi, 3-9 August.
3. Agarwal, S.C. and Ramani, R. (1997) Resource generation through technology transfer relating to lac culture, processing and products, presented at Regional Committee Meeting held at Patna.
4. Agarwal, S.C. (1997) Application of eco-friendly natural dye to textiles - lac dye, its industrial perspective, presented in National Seminar on " Eco-friendly Pathways to Textile Finishing and Agrro-waste Utilisation" organised by CIRCOT, Mumbai, on 4th March.
5. Saha, S.K., Goswami, D.N., Srivastava, B.C., Prasad, N. and Majee, R.N. (1997) Industrial potential of lac and some other natural products of Chhotanagpur in the symposium on 'Bioresources of Chhotanagpur and their industrial significance' on 20th September at ILRI, Ranchi.
6. Naqvi, A.H., Kumar, P., Mishra, Y.D., Singh, B.P. and Bhattacharya, A. (1997) Lac culture - a system approach to bioresource management in Chhotanagpur, in the symposium on 'Bioresources of Chhotanagpur and their industrial significance' on 20th September at ILRI, Ranchi.

Popular article

1. Agarwal, S.C., Jaiswal, A. K., Singh, B. P., Prasad, N. and Srivastava, B. C. "*Lakh Anusandhan - Baat Lakhon Ki*" *Kheti* Sept. 1977 page-9.

LIST OF APPROVED ON-GOING PROJECTS

Improvement in cultivation techniques

- To evolve management practices of *kusmi* lac production on *ber*
- To evolve management practices of *rangeeni* lac insect for broodlac and sticklac production on *palas* and *ber* separately

Control of enemies of lac insect

- Bio-rational approaches for management of pests of lac insect

Propagation and management of lac host plants

- Management of important lac hosts under agro-forestry system for *kusmi* lac production. .
- Management of *akashmani* (*Acacia auriculiformis*) for lac cultivation

Genetics and breeding of lac host plants and insects

- Collection, maintenance, conservation & evaluation of lac insect and host plant and their genetic improvement

Fine chemicals from lac

- Synthesis of some bio-active compounds from aleuritic acid

Modification of shellac/constituents and their utilisation

- Improvement in the method of preparation of lac dye and aleuritic acid
- Polyblends of shellac with synthetic polymers/resins-formulation, characterisation and application studies

Use of shellac and modified shellac in surface coatings

- Development of lac varnish for wood and metal lacquers for food packaging

TOT Activities

- Training, publicity, demonstration and information service
- Survey of current status, assessment of potentials and problems of lac culture and processing and consumer industries

Ad-hoc project (under A.P. Cess fund)

- Lac productivity rating of different lac insect on conventional and promising lac host

Revolving fund scheme

- Production of quality broodlac on *kusum* and *palas* at different agroclimatic regions

IMPORTANT COMMITTEES

The Institute Management Committee (IMC)

The 24th meeting of the IMC was held on 26th May 1997. The Committee finalized the work to be executed and list of equipments to be purchased during the year 1997-98 . It recommended a higher budget allocation for Plan and Non-Plan in 1997-98. Progress of research projects, ad-hoc project and revolving fund scheme was also reviewed in the meeting. The meeting was chaired by Dr S. C. Agarwal, Director. The members present in the meeting were Dr R.P. Kachru, ADG(PE), Mr S. S. Verka, Dr A.K. Singh, Mr G.P. Sharma, Dr S. K. Saha, Dr A. Bhattacharya, Dr K. M. Prasad and Mr R. K. Banerjee, A.O. (Member-Secretary).

The 25th meeting of IMC was held on 11th December 1997. The committee approved the list of equipments to be purchased and works to be executed during 1997-98 and 1998-99. It reviewed the progress of research of the on-going projects, ad hoc Project and Revolving Fund Scheme. It also considered the list of hospitals for medical treatment of ILRI staff and their dependents. The meeting was chaired by Dr S.C. Agarwal, Director and the members present were Dr R. P. Kachru, ADG(PE), Dr S.K. Saha, Dr S. K. Jaipuriar, Dr A. Bhattacharya, Dr K. M. Prasad, Mr S. S. Verka, Dr A. K. Singh, Mr G. P. Sharma and Sri S. Veeraswamy, A.O. (Member-

Members of IMC holding discussion during 25th meeting

Meeting of the QRT in progress

Secretary). Mementos were presented to Mr S. S. Verka and Dr A. K. Singh, the members nominated by Hon'ble Agriculture Minister as they were attending their last meeting as members.

Quinquennial Review Team

The first review meeting of QRT was held at the Institute during 21-24 June, 1997. Dr G.K. Veeresh, Chairman, Dr M. Yaseen, Dr V.R. Mamadapur, Mr Roshanlal Sharma, Member and Dr N. Prasad, Sr. Sc., (Member-Secretary) were present in the meeting. The QRT met the scientists, technicians and administrative staff of the Institute to discuss the research achievements, future requirements and invited suggestions for overall improvement in the working conditions in the Institute. The QRT also met lac

Members of the QRT interacting with a villager at Sarwada

cultivators at Sarwada (Murhu, Ranchi) an adopted village of Xavier's Institute of Social Service and also lac industrialists at M/s Tajna Shellac factory Pvt. Ltd., Khunti, Ranchi. The members were apprised of the problems faced by the lac cultivators and industrialists.

The second review meeting was held at the Institute during 11-14 October, 1997. Prof. G.K. Veeresh, Chairman; Dr M. Yaseen; Dr V.R. Mamadapur; Mr Roshanlal Sharma, Members and Dr N. Prasad, Sr. Sc., (Member- Secretary) attended the meeting to finalise the draft report.

Staff Research Council (SRC)

The meeting of the SRC was held on 28-29th May 1997. It finalised the research programme for the year 1997-98. Four new projects and two exploratory studies, in the Division of Lac Processing and Product Development, were approved in the light of the suggestions made by the SRC.

Dr R.P. Kachru, ADG (PE) addressing the scientists and Dr S.C. Agarwal, Director (Right)

PARTICIPATION OF SCIENTISTS IN SYMPOSIA, MEETINGS, WORKSHOPS ETC.

Attended by the Director

- National Seminar on Eco-friendly Pathways to Textile Finishing and Agro-Waste utilization, Organized by CIRCOT, Mumbai on March 4, 1997.
- Regional Committee meeting held at Patna on 1997
- Refresher course on "Advances in forestry" at B.A.U., Ranchi, 1997
- Army Environment and Nature Conservation Workshop at Ranchi on 3-9 August, 1997
- National workshop on "Development of Bastar through minor forest produce", organised by department of Commerce and Industry, Govt. of M.P. and Polytechnology Centre, Bhopal at Jagdalpur on 5-6 January 1998
- National Seminar on "Productivity in lacquerware craft" organised by National Productivity Council at Bangalore on 26th February

Attended by the scientists and staff members

- Dr A.K. Jaiswal, Scientist (Sr. Scale), attended a Summer School on "Assessment of modeling of soil and crop growth parameters using remote sensing and GIS" at Division of Agricultural Physics, IARI, New Delhi, during 9-29 July, 1997
- Dr S.N. Sushil, Scientist, attended a Summer School on "Recent advances in insect pest management in major crops" held at G.B.& Tech., Pantnagar during 7-27 July, 1997
- Dr S. Ghosal, Scientist, Shri R. Rabidas, Sr. Steno and Sri K. Oraon, Jr. Clerk attended a training programme on "Use of computer in agricultural research" conducted by IASRI, New Delhi, during 13-25 October, 1997
- Sri Ramesh Prasad and Sri D. Ganguly, Technical Officers, completed a computer training on Windows 3.11, MS-Office &Netware 4.11(LAN) at National Institute of Research on Jute and Allied Fibre Technology, Calcutta from 28th august to 5th September, 1997
- Dr N. Prasad, Senior Scientist, attended a seminar on 'Contemporary Bio-organic Chemistry' at Bhaba Atomic Research Centre, Mumbai, on 24 November, 1997
- Dr S.K. Saha, Principal Scientist and Head, Division of LP & PD, Dr D.N. Goswami and Dr B.C. Srivastava, Senior Scientists, attended the meeting of the Scientific Panel of Engineer-

ing Division of ICAR at IASRI, New Delhi on 24 November, 1997

- Dr S.K. Saha, Principal Scientist and Head and Dr N. Prasad, Sr. Scientist, Division of LP & PD visited Central Institute for Research on Cotton Technology, Mumbai on 25, 26 November, 1997 to acquaint themselves with the dyeing trials on cotton with lac dye.

  They also visited Indian Institute of Packaging, Mumbai on 26 November, 1997 to acquaint themselves with the latest trend in research on packaging.

- Dr S. K. Saha, P. S. and Head, LPPD Div., Dr N. Prasad, Sr. Scientist and Sri D. P. Dhingra, Scientist visited the IICT, Hyderabad for aquainting themselves with the pilot plan facilities available at that Institute.

- Dr S.K. Saha, Principal scientist and HOD, LP & PD attended the meeting of the Polishes and Lac & Lac Products, Sectional Committee of BIS, at the regional office of the Bureau of Indian Standards, Calcutta on 17 December, 1997.

  He also attended the Annual General meeting of the Shellac Export Promotion Council at the Council's Office at Calcutta on 18 December, 1997.

- Dr Anjesh Kumar, Hindi Translator, successfully completed a three-month training programme on translation from April to June 1997 at Calcutta. He was awarded a silver medal for attending second position in the course.

SEMINAR, SYMPOSIUM, ETC. ORGANISED

Symposium

As a part of the celebrations to mark the golden Jubilee Year of country's independence, a one-day symposium on "Bioresources of Chhotanagpur and Their Industrial Significance" was organised on 20th September, the foundation day of the Institute. The inaugural ceremony was chaired by Prof. Gajendra Singh, DDG(Engg.) and Sri B. Kapthuama, IAS, Director General, Sri Krishna Administrative Training Institute, Ranchi was the Chief Guest. Mr V. K. Prasad, President, Chhotanagpur Chamber of Commerce was also present. Twelve lead papers were presented in two technical sessions. Sixty five representatives from various organizations and the Institute participated in the symposium. The symposium projected the vast bioresources reserve of the Chhotanagpur region and stressed the need for its conservation and optimum exploitation for the economic development of the region. the major recommendations which emerged after deliberations are:

- Systematic survey, identification, collection and conservation of bioresources of the region.
- Optimum exploitation of the trees yielding products of commercial importance and the medicinal plants used by local people especially, tribes.
- Minimum support price, assured purchase mechanism and increasing domestic consumption and development of extension machinery especially, for lac and tasar.
- Regular interaction among those

Inaugural ceremony of the symposium. Mr V. K. Prasad, Mr B Kapthuama, Prof. Gajendra Singh, Dr S. C. Agarwal and Mr R. Ramani (Left to right)

A delegate presenting his paper during the symposium

who are involved in the production, marketing and the industry.

Institute seminars

A brainstorming seminar was held on 17.6.97 to discuss various issues arising out of the fast changing scenario and ever increasing expectation from the Institute. After thorough discussion, the following points emerged

- Integration of lac culture with agro-forestry system
- Diversification and perfection of technologies through pilot plant studies for increased utilisation of lac within the country
- Improvement in transfer of technology, publicity and marketing aspects

Seminars were also arranged as detailed below :

Topic	Speaker	Date
Lac insect taxonomy with special reference to Indian species	Mr Y.D. Mishra	19.6.97
Improved method for preparation of lac	Dr K.M. Prasad	28.10.97
Jalaric acid and its scope for use in synthesis	Dr N. Prasad	15.11.97
Means of improving TOT programmes of the Institute	Mr R. Ramani	24.12.97

DISTINGUISHED VISITORS

The Museum of Indian Lac Research Institute, Namkum, Ranchi is only one of its kind which provides information on lac cultivation, processing and applications. The Museum has always attracted visitors from all walks of life. During the period under report, besides the trainees about 504 persons visited the Museum

Some of the distinguished visitors were :

- Dr A.V. Rama Rao, Former Director, Indian Institute of Chemical Technology, Hyderabad - 500007 (A.P.)
- Mr Pralay Talukdar, Minister I/c, Cottage and Small Scale Industries, Govt. of W.B.
- Dr M Yaseen, Senior Dy. Director, Indian Institute of Chemical Technology, Hyderabad - 500 007 (A.P.)
- Dr GK Veeresh, Chairman, QRT, Vice-Chancellor University of Agricultural Sciences, Hebbal, Bangalore (Kar.)
- Dr VR Mamdapur, Scientist SE-II., Bhabha Atomic Research Centre, Anuysakti Nagar, Trombay, (MS)
- Major VS Sharma, 402, AD, Regt. (Lamps, Bangalore)
- Capt. AB Hangal, 511 ASC BN, C/O 56 APO,
- Lt. Col. R. Bhardwaj, Hi Fi Army Environment Conservation Work Shap. 03 Regt., 56 APO.
- Mr D.P. Yadav, Union Education Minister and Chairman, Transfer of Technology Samiti, M/o Agriculture, Govt. of India, New Delhi.
- Smt. Rita Sharma, Joint Secretary, M/O Agrl. Govt. of India, New Delhi.
- Mr Sita Ram Yadav, Member of Transfer of Technology Samiti, M/o Agrl. Govt. of India, New Delhi.
- Prof. S Das, Chairman, Post Harvest Technology Centre, Indian Institute of Technology, Kharagpur - 721 302 (WB)
- Dr S Nagarajan, Project Director (Wheat) Karnal (Haryana)

Dr S. C. Agarwal explaining to the visitors, at the Museum

PERSONNEL

Director
Dr S.C. Agarwal

Division of Lac Production

Head of Division
Dr P. Kumar

Senior Scientist
Sri A.H. Naqvi (Agric. Entomol)
Dr B. P. Singh (Agronomy)
Dr S. K. Jaipuriar (Agric. Entomol.)
Dr A. Bhattacharya (Agric. Entomol.)
Sri S.C. Srivastava (Plant Breeding)
Sri S.G. Chaudhary (Agric. Entomol.)

Scientist
Dr S.N. Sushil (Agric. Entomol.)
Dr S. Ghosal (Agro.)

Division of Lac Processing and Product Development

Head of Division
Dr S.K. Saha

Principal Scientist
Dr P.C. Gupta (Org. Chem.)

Senior Scientist
Dr D.N. Goswami (Physics)
Dr B.C. Srivastava (Org. Chem.)
Dr Niranjan Prasad (Org. Chem.)
Dr R.N. Majee (Org. Chem.)
Dr K.P. Sao (Physics)
Dr K.M. Prasad (Org. Chem.)

Scientist (Sr. Scale)
Sri P.M. Patil (Phys. Chem.)

Scientist
Sri P.C. Sarkar (Org. Chem.)
Sri V.K. Rao (Org. Chem.)
Sri D. Dhingra (Agri. Strc. Proc. Engg.)
Smt. S. Chopra (Electr. Engg.)

Division of Transfer of Technology

Head of Division
Dr K.K. Kumar

Sr. Scientist
Sri R. Ramani (Agric. Entomol.)
Dr A. Pandey (Phys. Chem.)
Sri Y.D. Mishra (Agric. Entomol.)

Scientist (Sr. Scale)
Sri A. K. Das Gupta (Org. Chem.)
Sri R.K. Banerjee (Org. Chem.)
Sri Radha Singh (Phys. Chem.)
Sri M.L. Bhagat (Agric. Entomol.)
Dr A.K. Jaiswal (Agric. Entomol.)
Dr K.K. Sharma (Agric. Entomol.)

Administrative Section
Sri S. Veeraswamy, A.O.
Sri N. Mahto, A.A.O.

Finance & Accounts Section I/c
Sri A.K. Lal, Asstt. Fin. & Accounts Officer (on deput.)

Hindi Cell I/c
Siri Laxmi Kant, Asstt. Director (O&L)

Farm Unit I/c
Sri N.K. Sharma, Farm Suptd. (T-7)

Library I/c
Sri R. P. Tewari, (T-5) Librarian

Testing Laboratory I/c
Sri Deepak Ghosh, T.O.

Mechanical Section I/c
Sri D. Dhingra, Scientist

Central Stores I/c
Dr K.M. Prasad, Sr. Sc

Diretor's Cell I/c
Sri R. Prasad, T.O.

Medical Unit
Dr N. P. Sahu, M.D. (Part time)

AS ON 31.12.1997

INFRASTRUCTURE DEVELOPMENT

Inauguration of ARIS Cell and Sale Counter

Sri Pralay Talukdar, Hon. Minister-in-charge, Cottage and Small Scale Industries Department, Govt. of West Bengal, visited Indian Lac Research Institute, Ranchi on 16th April, 1997. He inaugurated the ARIS (Agricultural Research Information System) Cell and a Sale Counter of the Institute.

In his meeting with the scientists, the Minister expressed happiness over the R&D efforts of ILRI and called upon the scientists to help in the development of lac industry in West Bengal, especially, in the industrially backwards districts of Purulia, Bankura and Midnapur which fall in the lac growing region of the country. He informed that there are about 50 lakhs of unemployed youth, besides a large section of unregistered manpower, in need of employment, especially in the rural area. He expressed that he has realized the great potential in lac for generation employment and assured his special attention for the development of lac-based small scale and cottage industries in West Bengal.

Mr Pralay Talukdar, Minister I/c, Cottage and Small-scale Industries, Govt. of W.B. formally inaugurating the ARIS Cell

कार्यकारी सारांश

स्वतंत्रता की पचासवीं वर्षगांठ के उपलक्ष्य में सम्पूर्ण वर्ष पूरे देश में कार्यक्रमों का तांता सा लगा रहा। इस अवसर पर संस्थान में भी विशेष कार्यक्रमों के आयोजन हेतु पहल किया गया। संस्थान के स्थापना दिवस 20 सितम्बर के "छोटानागपुर के जैविक संसाधन एवं उनके औद्योगिक महत्त्व" विषय पर एक संगोष्ठी का आयोजन किया गया। जैव भौगोलिक दृष्टि से छोटानागपुर इस क्षेत्र का एक विशिष्ट भाग है तथा यहाँ प्रचुर मात्रा में जैव सम्पदा उपलब्ध है। संगोष्ठी के दौरान कई आलेख प्रस्तुत किये गए एवं इस विचार विमर्श में विभिन्न जैविक संपदाओं को संरक्षित रखने के लिए आवश्यक कदम उठाने की जरूरत पर जोर दिया गया।

अनुसंधान

इस संस्थान के अनुसंधान का मुख्य उद्देश्य लाख की खेती संसाधन एवं उपयोगिता में सुधार लाना है। इस अवधि की कुछ महत्त्वपूर्ण उपलब्धियाँ निम्नवत है।

- वस्त्र एवं खाद्य उद्योग में लाख रंजक सहित प्राकृतिक रंजकों की मांग पुनः बढ़ी है। भारतीय लाख उद्योग में लाख रंजक के उत्पादन की विशाल क्षमता है जिसका उपयोग नहीं किया गया है। संसाधन के दौरान लाख रंजक को अलग करने की विधि में सुधार लाने के लिए भारतीय लाख अनुसंधान संस्थान में प्रयास किया गया है। लाख रंजक का कैल्शियम लवण कच्चा लाख रंजक एवं शुद्ध लाख रंजक (90%) प्रयोगशाला स्तर पर तैयार करने की विधि को मानकीकृत किया गया।
- चपड़े में कुछ अनोखा विद्युतीय गुण होता है जिसका विद्युत अवरोधक के रूप में उपयोग किया जाता है परन्तु इसकी तापीय अवरोधक क्षमता कम होने के कारण इस क्षेत्र में इसकी उपयोगिता कम है। उपयुक्त कृत्रिम रेजीनों के साथ रूपान्तरण कर तापीय अवरोधक क्षमता में सुधार के लिए सतत् प्रयास जारी है. फलतः एक कृत्रिम रेजीन एवं सामान्य घोलक चपड़ा आधारित भर्जित प्रकार का उच्च ताप अवरोधक विद्युतरोधी वार्निश का विकास किया गया है। परिवर्द्धित लाख फिल्म में पर्याप्त परावैद्युत गुणों के अतिरिक्त लचीला एवं 200-220 से. तक ताप अवरोधक क्षमता है।
- एल्युरिटीक अम्ल लाख रेजीन के अम्लों का एक घटक है एवं इसे साधारण विधि से अलग किया जा सकता है। यह पाया गया कि बहुत से आर्थिक महत्व के कीमती यौगिको के संश्लेषण में इसका प्रारम्भिक वस्तु के रूप में उपयोग किया जा सकता है। चौरी एवं किरी (लाख उद्योग का उपोत्पाद) के पुराने एवं ताजा नमूनों से एल्युरिटीक अम्ल अलग करने की विधि को संभव बनाया गया है।
- पर्यावरण प्रदूषण में कमी लाने के लिए सामान्यतया कीटनाशी दवाओं के प्रयोग को निरूत्साहित किया जा रहा है। लिंग फिरोमोन का पर्यवेक्षण एवं नियंत्रण का प्रयोग नाशीजीव प्रबन्धन की एक वैकल्पिक पद्धत्ति है। लैपीटोप्टेरस नाशीजीव के लिंग फिरोमोन अवयवों के रूप में उपस्थित दो यौगिकों (जेड-9 - हेक्सा-डेकेन - 1 - ओल एवं इसके एसीटेट) को इरीथ्रो एल्युरिटिक अम्ल से संश्लेषित किया गया है।
- उत्पाद के सूत्रण एवं मूल्यांकन के लिए संगलन गुणों जैसे भौतिक गुणों की पुरी जानकारी सहायक होती है। लाख की संगलन स्थिति अद्‌भूत है डिफेरेन्सियल स्कैनिंग कैलोरीमेट्री का उपयोग कर

लाख संबंधी विवरण का अध्ययन करने पर पता चला कि लाख का संगलन एक द्विचरणी प्रक्रिया है; इसका लाख के नमूनों में मोम की उपस्थिति का पता लगाने के लिए भी प्रयोग किया जा सकता है। इस अध्ययन से यह पुष्टि होती है कि लाख एक सम्पूर्ण रूप से तापस्थापक रेजीन नहीं है।

- बेर लाख का महत्वपूर्ण परिपालक है तथा इसे कुसमी लाख, जिसका विक्रय मूल्य बहुत अधिक होता है, उगाने में सफलतापूर्वक प्रयोग में लाया जा सकता है। यह पाया गया कि बेर पर बरसाती कुसमी लाख उगाने मानसून की अवधि में संचारण करने से लार्वा की स्थापना की सघनता अधिकतम तथा मरणशीलता न्यूनतम होती है।
- लगातार क्षेत्र परीक्षणों के द्वारा पलास एवं बेर परिपालकों का अलग-अलग संदोहन करने के लिए उनपर बीहन लाख एवं कच्ची लाख की उपज को अधिकतम बनाने हेतु रंगीनी लाख फसल की खेती के तरीके को परिवर्द्धित किया गया है।
- नाशीजीव प्रबन्धन के लिये जैविक नियंत्रण उपाय पर विशेष ध्यान दिया जा रहा है क्योंकि यह पारिस्थितिकी की दृष्टि से सुरक्षित है। लाख कीट के लेपिडोप्टेरस नाशीजीव के नियंत्रण के लिए पारासीट्वाइड्स के उपयोग की काफी संभावनाएं हैं. इस दिशा में लेपिडोप्टेरस लाख परभक्षी, जो लाख की फसल को बहुत नुक्सान पहुँचाता है, के जैविक नियंत्रण के लिए पाँच संभाव्य पारासीट्वाइड अण्डे की पहचान की गई है।

संबद्धताएं

लाख के अनुसंधान, प्रसार एवं शिक्षा को व्यापक बनाने की दृष्टि से अपनी गतिविधियों की विभिन्न क्षेत्रों में परस्पर सहयोग के लिए संस्थान एवं बिरसा कृषि विश्वविद्यालय, कांके के बीच एक समझौता ज्ञापन पर हस्ताक्षर किये गए। इसके अन्तर्गत विश्वद्यिालय से स्नातक (कृषि) पाठ्यक्रम के शैक्षिणिक पाठ्य विवरण में लाख की खेती एवं औद्योगिक पहलू को शामिल किया गया है। इस शैक्षणिक कार्यक्रम में संस्थान के विशेषज्ञ भाग लेंगे।

आधारभूत विकास

प० बंगाल के लघु एवं कुटीर उद्योग मंत्री श्री प्रलय तालुकदार ने संस्थान के एरीस सेल का उद्घाटन किया।

प्रचार

संस्थान में लाख आधारित उत्पादों का एक विक्रय काउन्टर खोला गया है। यह काउन्टर संस्थान द्वारा विकसित विभिन्न लाख आधारित उत्पादों को बढ़ावा देने एवं लोकप्रिय बनाने के लिए उपयोगी होगा जिसमें लाख की उपयोगिता को बढ़ाने का मार्ग प्रशस्त होगा। संस्थान द्वारा तेरह प्रकाशन निकाले गए, जिसमें ''लाख उद्योग समस्याएँ और समाधान'' विषय पर आयोजित राष्ट्रीय विचार गोष्ठी की कार्यवाही भी शामिल है।

संदर्श योजना

इस वर्ष संस्थान की भविष्य की गतिविधियों के लिए ब्लूप्रिंट को अंतिम रूप प्रदान करने हेतु गहन विचार विमर्श किया गया। विभिन्न स्तरों पर मस्तिष्क को उद्वेलित करने वाले कई सत्रों एवं गहन विश्लेषण के परिणाम स्वरूप वीजन 2020 के रूप में अगले 25 वर्षो के लिए संदर्श योजना तैयार की गई। संस्थान की पंचवर्षीय समीक्षा दल ने यहाँ के कार्य के प्रगति की समीक्षा की तथा अल्पावधि अनुसंधान की रणनीति विकसित करने हेतु संस्थान के वैज्ञानिकों से विचार विमर्श किया।

परिचय

भारतीय लाख अनुसंधान संस्थान की स्थापना 1925 में हुई। भारत में लाख उद्योग की स्थिति की जाँच एवं इसके सर्वांगिंण विकास के लिए सुझाव देने हेतु 1920 के आरम्भ में तत्कालिन भारत सरकार द्वारा गठित श्री एच. ए. एफ. लिंडसे एवं श्री सी. एम. हार्लो की दो सदस्यीय समिति की अनुशंसा के फलस्वरूप इस संस्थान का प्रदूर्भाव हुआ। समिति की रिपोर्ट 1921 में प्रकाशित हुई। अन्य पहलुओं के अलावे उन्होंने लाख के लगातार उत्पादन के लिए वैज्ञानिक रूप से जाँची परखी विधि से सघन खेती की अनुशंसा की। उन सुझावों के आलोक में उस समय के लाख व्यापारी ''भारतीय लाख अनुसंधान संगठन'' नामक एक निजी पंजीकृत संस्था के अन्तर्गत संगठित हुए। इस संगठन को राज्य सरकार से भूमि प्राप्त हुई तथा संस्थापक निदेशक श्रीमती डोरोथी नॉरीस के अधीन संस्थान ने कार्य करना आरम्भ किया।

आरम्भ में कीट विज्ञान अनुभाग संस्थान की प्रमुख ईकाई थी तथा जैव रसायन अनुभाग उसकी सहयोगी थी। तत् पश्चात् 1920 के दशक में अनुप्रयुक्त अनुसंधान के लिए भौतिक रसायन अनुभाग बना। तदुपरांत इन दोनो रसायन अनुभागों को मिलाकर एक रसायन विभाग बना। इस तरह इस संस्थान का कार्यक्षेत्र कीट वैज्ञानिक एवं रासायनिक दोनों पहलुओं तक फैल गया।

1930 में राजकीय कृषि आयोग की अनुशंसा के आधार पर केन्द्रीय विधायिका द्वारा भारतीय लाख कर अधिनियम के अधीन भारत सरकार ने भारतीय लाख कर समिति का गठन किया, जिसने 1931 में संस्थान को ''लाख संगठन'' से अपने नियंत्रण में ले लिया। द्वितीय विश्वयुद्ध के बाद 1951 एवं 1956 में गठित प्रथम एवं द्वितीय समीक्षा समितियों ने मूल एवं अनुप्रयुक्त अनुसंधान पर समान रूप से बल देते हुए विस्तृत अनुसंधान कार्यक्रम बनाये। उस अवधि में क्षेत्रीय समस्याओं को दूर करने के लिए झालदा (प. बंगाल), दमोह, उमरिया (म.प्र.) एवं मिर्जापुर (उ. प्र.) में चार क्षेत्रीय अनुसंधान केन्द्र स्थापित किये गए। बाद में विभिन्न प्रकार के निर्मित लाख की गुणवता नियंत्रण हेतु लाख निर्माताओं की सहायता के लिए क्षेत्रीय जाँच प्रयोगशाला भी स्थापित की गई। ये प्रयोगशालाएँ 1959 में झालदा (प. बंगाल) एवं गोन्दिया (महाराष्ट्र), 1961 में बलरामपुर (प. बंगाल) एवं डालटनगंज (बिहार) तथा 1962 में नामकुम (बिहार) में स्थापित की गई।

लाख कर समिति की समाप्ति के बाद 01 अप्रैल 1966 में भारतीय कृषि अनुसंधान परिषद् (भा.कृ.अनु.प.) ने संस्थान को अपने प्रशासकीय नियंत्रण में लिया। शेशाद्री समिति की अनुशंसा के आधार पर दिसम्बर 1971 में संस्थान को रसायन विज्ञान, कीट विज्ञान, शस्य विज्ञान एवं पौध आनुवंशिकी, प्रौद्योगिकी तथा प्रसार पाँच विभागों में पुनर्गठित कर सुदृढ़ किया गया।

संस्थान

यह संस्थान राँची टाटानगर राष्ट्रीय राज पथ पर राँची शहर से 9 किलोमीटर पूरब शान्तिपूर्ण उपनगरीय क्षेत्र में स्थित है। यह स्थान समुद्र तल से लगभग 650 मी. ऊँचा तथा क्षांश 23°23' उ. एवं देशान्तर 85°23' पूरब के बीच अवस्थित है। संस्थान की मिट्टी ग्रेनाइट जेनेसीस पर विकसित हुई है तथा बागान क्षेत्र की मिट्टी लैटेरिटीक तरह की है। नामकुम में प्रायोगिक

बागान (लगभग 36.5 हे.) सहित संस्थान की कुल जमीन 49 हे. है। पारिस्थितिकी की दृष्टि से इस क्षेत्र में मध्यम स्वास्थ्य वर्द्धक जलवायु है तथा दिसम्बर का तापक्रम 26° से (सबसे कम न्यूनतम 8.8° से.) एवं मई में 43° से (सबसे कम न्यूनतम 20° से.) के बीच रहा है। इस अवधि में कुल वर्षा 1629.25 मी.मी. हुई जिसमें मानसून की वर्षा 1389.25 मी.मी. थी।

मुख्य परिसर में औषधालय एवं आवासीय क्वार्टरों के अतिरिक्त लाख उत्पादन विभाग, लाख संसाधन एवं उत्पाद विकास विभाग, प्रौद्योगिकी हस्तांतरण विभाग, प्रशासकीय अनुभाग, वित्त एवं लेखा अनुभाग, पुस्तकालय, निदेशक प्रकोष्ठ, कृषि अनुसंधान आसूचना तंत्र प्रकोष्ठ, राजभाषा प्रकोष्ठ एवं यांत्रिकी अनुभाग है। इससे सटे एक छोटा परिसर है जिसमें संसाधन प्रयोगशाला एवं स्टाफ के आवास गृह हैं। संस्थान के दोनों परिसरों में खेल का मैदान है।

वर्त्तमान स्थिति

सम्प्रति देश की खुली आर्थिक नीति, उद्योगों एवं कृषि उद्यमों की विश्वव्यापकता एवं भा.कृ.अनु.प. का संरचनात्मक एवं कार्यात्मक पुनर्गठन के मद्दे नजर संस्थान में भी संरचनात्मक परिवर्त्तन हुआ है एवं प्रार्थमिकताओं की पुनर्समीक्षा की गई है। पुराने विभागों/अनुभागों को समाप्त कर वैज्ञानिक क्षमताओं को लाख उत्पादन, लाख संसाधन एवं उत्पाद विकास तथा प्रौद्योगिकी हस्तांतरण नामक तीन विभागों में वितरण किया गया है। संस्थान द्वारा म.प्र., प. बंगाल एवं उड़ीसा में तीन क्षेत्रीय अनुसंधान केन्द्र चलाए जा रहे हैं। संस्थान से बाहर के प्रयोगों के लिए क्षेत्र एवं वृक्षों को दीर्घावधि लीज पर लिया गया है। भौतिक एवं मानवीय क्षमताओं की आधारभूत संरचना के व्यापक विकास की शुरूआत की गई है। संचार एवं सूचना के पुन: प्राप्ति हेतु सूचना भंडार तक वैज्ञानिकों की पहुँच बनाने के लिए कृषि अनुसंधान आसूचना तंत्र (एरीस सेल) प्रकोष्ठ गठित की गई है।

अपने स्थापना काल से ही संस्थान ने लाख की खेती के वैज्ञानिक तरीकों से होने वाले लाभ के संबंध में आदिवासियों को जागरूक बनाने में महत्वपूर्ण भूमिका अदा की है। संस्थान समुचित प्रौद्योगिकी को बढ़ावा देने, विकसित करने तथा पृथक करने के लिए लगातार प्रयासरत है। संस्थान के पास लाख की खेती के वैज्ञानिक तरीके के लिए प्रौद्योगिकी उपलब्ध है और अनुरोध करने पर सभी प्रमुख लाख परिपालकों के लिए पैकेज एवं तरीकों की जानकारी दी जाती है। बिहार, पं. बंगाल, उ.प्र., म.प्र. एवं उड़ीसा के लगभग 80,000 वर्ग कि.मी. क्षेत्र में कमजोर वर्गों के लाख के प्रमुख उत्पादकों के लिए संस्थान प्रौद्योगिकी का विस्तार करती है।

औद्योगिक पहलू की भी उपेक्षा नहीं की गई। संस्थान ने सतत् अपनी वैज्ञानिक क्षमताओं को उपभोक्ता उद्योग की बदलती हुई मांगों के अनुरूप केन्द्रीत किया है। कई उत्पाद एवं प्रक्रियाएं विकसित की गई है। पूर्व में इच्छुक लोगों के अनुरोध पर नि:शुल्क प्रौद्योगिकी हस्तांतरित की जाती थी। संप्रति परिषद् द्वारा संसाधन की प्राप्ति हेतु निश्चित किये गए लक्ष्य प्राप्त करने के उद्धेश्य के प्रौद्योगिकी हस्तांतरण के लिए मामूली शुल्क लिया जाता है। लाख की खेती एवं उपयोग के क्षेत्र में योगदान के लिए संस्थान को अन्तर्राष्ट्रीय मान्यता मिली है।

संस्थान के अधिदेश

मुख्य संस्थान के लिए:

- उपलब्ध या आनुवंशिक रूप से विकसित लाख कीट एवं लाख परिपालकों को अपना कर लाख की खेती की प्रौद्योगिकी विकसित करना।

- उद्योगों के लिए लाख संसाधन की तकनीक का विकास।
- पायलट संयत्र प्रदर्शन हेतु लाख के उपयोग में विविधता लाने के लिए अनुसंधान।
- कृषकों एवं उद्यमियों के लिए प्रौद्योगिकी हस्तांतरण।
- लाख के उत्पादन, संसाधन एवं उपयोग पर सूचना संग्राहक के रूप में कार्य करना।

क्षेत्रीय अनुसंधान केन्द्रों के लिए

- भिन्न-भिन्न कृषि-जलवायु की परिस्थितियों के अन्तर्गत लाख की खेती की विकसित प्रौद्योगिकी की जाँच।
- बीहन लाख का उत्पादन एवं क्षेत्रीय परिपालकों की खोज।
- कृषि वानिकी पद्धत्ति में लाख के उत्पादन को बढ़ाने हेतु कृषकों का प्रशिक्षण।
- क्षेत्रीय आधार पर उद्यमियों को जागरूक बनाने का कार्यक्रम।

संगठित ढांचा

संस्थान के प्रधान निदेशक है। वैज्ञानिक निम्नलिखित तीन विभागों में कार्यरत हैं। (1) लाख उत्पादन (2) लाख संसाधन एवं उत्पाद विकास एवं (3) प्रौद्योगिकी हस्तांतरण प्रशासनिक स्कंध में निदेशक कार्यालय, प्रशासकीय अनुभाग, क्रय अनुभाग, वित्त एवं लेखा अनुभाग एवं केन्द्रीय भंडार शामिल हैं। पुस्तकालय, निदेशक प्रकोष्ठ, प्रक्षेत्र ईकाई एवं अनुरक्षण तथा कर्मशाला अनुभागों के द्वारा तकनीकी सहायता प्रदान की जाती है। राजभाषा प्रकोष्ठ, सुरक्षा, चिकित्सा एवं सम्पदा अनुरक्षण सेवाएं सहायक ईकाईयाँ हैं।

स्टाफ

संस्थान में 51 वैज्ञानिक, 83 तकनीकी, 51 प्रशासकीय एवं 110 सर्पोटिंग ग्रेड के स्वीकृत पद है.

बजट

1997-98 की अवधि में योजना एवं गैर योजना मद में खर्च का विवरण नीचे सारिणी में दिया गया है।

1997-98 के दौरान भा.ला.अनु.सं. का बजट

लेखा शीर्ष	बजट अनुमान 97-98	संशोधित अनुमान 97-98	वास्तविक व्यय
व्यय	(रू.लाख में)	(रू. लाख में)	(रू. लाख में)
योजना			
स्थापना शुल्क	10.00	12.50	12.77
वेतन	–	–	–
समयोपरि भत्ता	–	–	–
यात्रा भत्ता	1.00	1.25	1.01
उपकरण समेत अन्य शुल्क	35.00	37.00	36.09
कार्य	24.00	34.00	33.56
कुल	70.00	84.75	83.43
गैर योजना			
स्थापना शुल्क	190.00	214.00	206.68
वेतन	–	–	–
समयोपरि भत्ता	0.05	0.05	0.05
यात्रा भत्ता	1.60	2.50	1.77
उपकरण समेत अन्य शुल्क	13.35	35.45	34.11
कुल	205.00	252.00	242.61

राजभाषा एकक

भारत सरकार के राजभाषा विभाग द्वारा तैयार किए गए वार्षिक कार्यक्रम एवं राजभाषा अधिनियम तथा नियमों के संबंध में भारतीय कृषि अनुसंधान परिषद् नई दिल्ली से समय-समय पर प्राप्त निर्देशों के अनुवर्त्ती कार्रवाई तथा सरकारी काम काज में राजभाषा हिन्दी के अधिकाधिक प्रयोग की पृष्ठभूमि तैयार करने तथा प्रोत्साहन योजना को कार्यान्वित करने के अभिप्राय से संस्थान में राजभाषा एकक का गठन किया गया है। इसमें एक सहायक निदेशक (राजभाषा) एवं हिन्दी अनुवादक कार्यरत हैं :

संस्थान के दैनिक कार्यो में हिन्दी के प्रयोग में प्रगति, हिन्दी को सर्वग्राहय बनाने के लक्ष्य की प्राप्ति एवं बहुआयामी उपयोग के लिए राजभाषा एकक द्वारा निम्नलिखित कार्य सम्पादित किए जाते हैं।

- संस्थान राजभाषा कार्यान्वयन समिति की बैठकों का आयोजन, कार्यसूची एवं कार्यवृत की तैयारी तथा लिए गए निर्णयों पर अनुवर्ती कार्रवाई।
- वार्षिक रिर्पोट का सारांश, कार्यालय आदेश परिपत्र, ज्ञापन, निविदा सूचना, कोटेशन एवं पत्राचार के विभिन्न सामग्रियों का अनुवाद।
- हिन्दीतर अधिकारियों/कर्मचारियों को हिन्दी शिक्षण योजना द्वारा आयोजित प्रशिक्षण कार्यक्रम में सम्मिलित होने हेतु नामित्त करवाना।
- हिन्दी दिवस, हिन्दी पखवाड़ा एवं हिन्दी के विभिन्न प्रतियोगिताओं का आयोजन।
- संदर्भ साहित्य, हिन्दी पत्रिकाएँ, शब्दकोष एवं तकनीकी शब्दावलियों का उपार्जन।
- द्विभाषी मुहरों, नामपट्ट एवं साइनबोर्ड का निर्माण।
- प्रचार सामग्रियों, विवरणियों एवं सूचनाओं का संकलन एवं समाचार पत्र में प्रकाशन हेतु प्रेस रिलीज की तैयारी।
- नगर राजभाषा कार्यान्वयन समिति की अनुशंसा का कार्यान्वयन।

उपरोक्त कार्यों के निष्पादन हेतु संस्थान राजभाषा कार्यान्वयन समिति कार्यरत रही। समिति में निम्न-लिखित सदस्य थे :-

डॉ. सतीश चन्द्र अग्रवाल, निदेशक	- अध्यक्ष
डॉ. शिशिर कुमार साहा, अध्यक्ष लाख संसाधन एवं उत्पाद विकास विभाग	- सदस्य
डॉ. प्रणय कुमार, अध्यक्ष, लाख उत्पादन विभाग	- सदस्य
श्री रंगनादन रमणि, अध्यक्ष, प्रौद्योगिकी हस्तांतरण विभाग	- सदस्य
डॉ. कौशल किशोर कुमार, अध्यक्ष प्रौद्योगिकी हस्तांतरण विभाग	- सदस्य
श्री नरेन्द्र कुमार शर्मा, फार्म अधीक्षक	- सदस्य
श्री रजत कुमार बनर्जी, वैज्ञानिक (वरीय वेतनमान) कार्यकारी प्रशासनिक अधिकारी	- सदस्य
श्री नागेन्द्र महतो, सहायक प्रशासनिक अधिकारी कार्यकारी प्रशासनिक अधिकारी	- सदस्य
श्री लक्ष्मी कान्त, सहायक निदेशक (रा. भा.)	- सदस्य सचिव

निदेशक महोदय की अध्यक्षता में संस्थान में, 12.5.97, 28.8.97 एवं 9.9.97 को राजभाषा कार्यान्वयन समिति की बैठक में निम्नलिखित महत्वपूर्ण निर्णय लिए गए:

कम्प्यूटर प्रशिक्षण

- प्रशासनिक नियमों की हिन्दी कार्यशाला का आयोजन
- संस्थान के उद्देश्य संबंधी द्विभाषी बोर्ड का निर्माण
- हिन्दी पखवाड़ा, हिन्दी दिवस समारोह का आयोजन
- आज के शब्द के लिए अंग्रेजी शब्दों का हिन्दी रूपान्तर
- कम्प्यूटरों में हिन्दी के सॉफ्टवेयर लगाना
- हिन्दी टिप्पण, निबंध, प्रारूप लेखन, वाद-विवाद, भाषण काव्य पाठ एवं अन्ताक्षरी आदि प्रतियोगिताओं का आयोजन

उपरोक्त निर्णयों के आलोक में संस्थान के बाकी विभागों/अनुभागों में प्रयुक्त होनेवाले द्विभाषी/हिन्दी मुहरें तैयार करवाकर वितरित किया गया तथा समिति के निर्णयों की कार्यवृत की तैयारी एवं अनुवर्ती कार्रवाई की गई।

16 सितम्बर 1997 की हिन्दी पखवाड़ा का समापन एवं हिन्दी दिवस समारोह का आयोजन किया गया। संस्थान पुस्तकालय में संदर्भ साहित्य के रूप में हिन्दी पत्र पत्रिकाओं एवं पुस्तकों का उपार्जन किया गया।

राँची नगर स्तरीय प्रतियोगिता में कृतीत्व

राँची नगर राजभाषा कार्यान्वयन समिति द्वारा आयोजित नगर स्तरीय हिन्दी टिप्पण प्रारूप लेखन प्रतियोगिता में श्री शरत चन्द्र लाल, कनीय लिपिक को द्वितीय स्थान प्राप्त हुआ, फलस्वरूप उन्हें नकद पुरस्कार एवं प्रमाण पत्र से सम्मानित किया गया।

अनुवाद प्रशिक्षण में रजत पदक

संस्थान के हिन्दी अनुवादक डॉ. अंजेश कुमार को केन्द्रीय अनुवाद ब्यूरो कलकता में अनुवाद प्रशिक्षण दिलवाया गया। उक्त प्रशिक्षण में उनका परिणाम उत्कृष्ट रहा तथा उन्हें रजत पदक प्रदान किया गया।

नकद पुरस्कार योजना

राजभाषा विभाग के प्रावधानों के अनुसार मूल रूप से हिन्दी में टिप्पण एवं प्रारूप लेखन हेतु श्री शरत चन्द्र लाल को प्रथम एवं श्री रघुनाथ महतो को द्वितीय पुरस्कार प्रदान किया गया।

हिन्दी प्रतियोगिताओं का आयोजन

संस्थान में राजभाषा हिन्दी के प्रयोग को बढ़ाने एवं अधिकारियों एवं कर्मचारियों के बीच हिन्दी के प्रयोग में स्पर्द्धा उत्पन्न करने के लिए विभिन्न हिन्दी प्रतियोगिताओं का आयोजन किया गया एवं प्रथम तथा द्वितीय स्थान प्राप्त करने वाले निम्नलिखित प्रतिभागियों को पुरस्कृत किया गया।

हिन्दी प्रतियोगिताओं के परिणाम

टिप्पण एवं प्रारूपण

प्रथम - श्री शरत चन्द्र लाल, कनीय लिपिक

द्वितीय - श्री कवल किशोर प्रसाद, तकनीकी अधिकारी

वाद-विवाद

प्रथम - श्री प्रहलाद सिंह, वरीय लिपिक

द्वितीय - श्री कवल किशोर, प्रसाद, तकनीकी अधिकारी

निबंध

प्रथम - श्री कवल किशोर प्रसाद, तकनीकी अधिकारी

द्वितीय - श्री अमर कुमार सहाय, तकनीकी अधिकारी

सुलेख

प्रथम - श्री अनिल कुमार सिन्हा, (टी-II-3)

द्वितीय - श्री ध्रुवदेव प्रसाद, (टी-II-3)

काव्य पाठ

प्रथम - श्री बैजनाथ गोप, वरीय लिपिक

द्वितीय - श्री विजय कुमार तिवारी, (टी-II-3)

व्याख्यान

प्रथम - श्री कवल किशोर प्रसाद, तकनीकी अधिकारी

द्वितीय - श्री अनिल कुमार सिन्हा, (टी-II-3)

अंताक्षरी - विजयी दल

श्री अरूण कुमार त्रिपाठी

श्री अुर्जन गोप

श्री कामेश्वर प्रसाद आर्य

श्री अर्जुन शर्मा

श्री अनिल कुमार सिन्हा

श्री कवल किशोर प्रसाद

श्री लाखन राम

हिन्दी दिवस समारोह

संस्थान राजभाषा कार्यान्वयन समिति के तत्वावधान में भारत सरकार के राजभाषा विभाग द्वारा निर्धारित कार्यक्रमों के अनुपालन एवं समय-समय पर जारी आदेशों/अनुदेशों के कार्यान्वयन की लेखा-जोखा एवं हिन्दी के प्रयोग में प्रगति लाने के उद्देश्य से वार्षिक कार्यक्रम एवं हिन्दी पखवाड़ा के समापन समारोह के साथ में संस्थान में दिनांक 16 सितम्बर 1997 को ''हिन्दी दिवस समारोह का आयोजन किया गया। समारोह में योगदा सत्संग महाविद्यालय जगन्नाथपुर के विभागाध्यक्ष हिन्दी, डॉ. श्री कृष्ण पाण्डेय मुख्य अतिथि के रूप में उपस्थित थे। डॉ. पाण्डेय द्वारा दीप प्रज्जवलित किए जाने के साथ ही समारोह का शुभारंभ हुआ।

संस्थान के निदेशक डॉ. सतीश चन्द्र अग्रवाल ने स्वागत भाषण में हिन्दी दिवस की उपादेयता के संदर्भ में कहा कि प्रत्येक वर्ष हिन्दी दिवस का आयोजन हिन्दी के प्रति आस्था एवं हिन्दी में कार्य करने की प्रतिबद्धता को दुहराने के लिए किया जाता है। हिन्दी राष्ट्रभाषा राजभाषा एवं जन-जन की सम्पर्क की भाषा है, तथा इसकी लिपि देवनागरी अत्यंत सरल एवं सहज है। संस्थान में हिन्दी का अधिकाधिक प्रयोग हो रहा है। यहाँ हिन्दी माध्यम से प्रशिक्षण, व्याख्यान एवं गोष्ठियों का आयोजन किया जाता है।

मुख्य अतिथि के रूप में बोलते हुए डॉ. श्रीकृष्ण पाण्डेय ने कहा कि हिन्दी दिवस की सार्थकता तब होगी जब इसे ''आत्मालोचना दिवस'' के रूप में लिया जाय। इन्होंने कहा कि हिन्दी भारत के दिल की भाषा है। इसका इतिहास अंग्रेजी से भी अधिक पुराना है। संस्कृत से निकली यह भाषा आदिकाल से ही संपर्क भाषा रही है। उन्होंने अमीर खुसरो, महात्मागांधी, बाल गंगाधर तिलक, डॉ. ग्रियर्सन, दयानन्द सरस्वती आदि प्रसिद्ध हस्तियों को उद्धृत करते हुए बताया कि हिन्दी का व्याकरण विश्व में सरलतम व्याकरणों में से एक है। डॉ. पाण्डेय ने कई देशों का उदाहरण देते हुए बाताया कि प्राय: सभी देशों की अपनी भाषा है तथा वहाँ के निवासी अपनी भाषा का प्रयोग गर्व के साथ करते हैं। भारतीय संस्कृति से जुड़े सभी भाषाओं के पक्षधर डॉ. पाण्डेय ने खेद प्रकट किया कि भारत में हिन्दी को अपेक्षित सम्मान नहीं मिल रहा है।

डॉ. सतीश चन्द्र अग्रवाल, निदेशक, स्वागत भाषण देते हुए

संस्थान में हिन्दी के प्रयोग संबंधी प्रतिवेदन प्रस्तुत करते हुए सहायक निदेशक (राजभाषा) श्री लक्ष्मीकान्त ने जानकारी दी कि हिन्दी माध्यम से प्रशिक्षण कार्यक्रम, वैज्ञानिक गोष्ठियाँ, किसान मेले एवं रेडियो कृषि पाठशाला के कार्यक्रम सुचारू रूप से हिन्दी माध्यम से सम्पादित हो रहे हैं। मूल रूप से हिन्दी में कार्य करने वाले अधिकारियों एवं कर्मचारियों

के लिए नकद पुरस्कार योजना लागू की गई है। राजभाषा के प्रयोग के संबंध में उन्होंने कहा ''हमारा अतीत गौरवमय है, वर्त्तमान के प्रति हम सजग हैं एवं भविष्य के प्रति आशावान हैं''।

भारत सरकार, केन्द्रीय सचिवालय एवं अन्य प्रकाशकों के साथ-साथ संस्थान द्वारा प्रकाशित हिन्दी पुस्तकों, प्रचार बुलेटिनों एवं प्रचार पत्रकों की एक प्रदर्शनी लगाई गई।

समारोह के उपलक्ष्य में आयोजित सांस्कृतिक कार्यक्रमों में सुश्री कृषा डे, श्री विनय कुमार सिंह ने भजन, सुश्री ज्योति लक्ष्मी, मौसमी डे, पार्थसारथी डे तथा मलय मिश्र ने देश भक्ति गीत, श्री कवल किशोर प्रसाद, श्री अनिल कुमार सिन्हा, श्री बैजनाथ गोप तथा डॉ. अंजेश कुमार ने कविता पाठ किए। ''वर्तमान पीढ़ी की हिन्दी भाषा के प्रति उदासीनता'' शीर्षक पर श्री राम प्रताप तिवारी पुस्तकालयाध्यक्ष ने रोचक संस्मरण सुनाया। डॉ. निरंजन प्रसाद द्वारा प्रस्तुत व्यंग्य की भी दर्शकों ने सराहना की।

हिन्दी प्रतियोगिताओं एवं उनके विजेताओं का विवरण डॉ. अनिल कुमार जायसवाल ने दी मुख्य अतिथि डॉ. श्रीकृष्ण पाण्डेय के कर कमलों से विजेताओं के बीच पुरस्कार वितरण किया गया। धन्यवाद ज्ञापन हिन्दी दिवस समारोह आयोजन समिति के अध्यक्ष डॉ. अजय भट्टाचार्य ने किया।

INDIAN LAC RESEARCH INSTITUTE

NAMKUM, RANCHI

FAX : 0651-520202

Phone

Office : 520202

EPBAX : 520117

TELEGRAM : LACCUM

E-mail : ILRI@x 400.NICGW.NIC.IN