PROSPECTS OF SERICULTURE IN TEA & COFFEE PLANTATIONS

CSRTI MYSORE

Plantation at Banagudisolai, Nilgiris

PRELUDE

Sericulture is one of the few oldest traditions of human civilization and India has the historical records of participating in trade along the silk road and also along waterways to middle-east and Europe. Today, India is the second largest producer of silk in the world.

Presently, every viable industry is based on the integrated approach and Indian Sericulture, to take a big leap, essentially needs an integrated approach. This particular realisation, during the last five years by the scientists and administrators attached with Central Silk Board has given a new direction to research, extension and training activities of the organisation.

India is proud of being the highest producer of Tea in the world and Indian coffee is no less attractive. In India, both have still large prospects for development towards economic upliftment of the rural masses.

The essentiality of integrated approach for sericulture along with Tea and Coffee cultivation is vastly indicated by the initiative taken by tea and coffee planters themselves.

Responsibilities of the sericulturist lies in giving the correct scientific direction, help them in experimenting upon the projects and reaping a rich harvest.

And this is to move our motherland towards a better future....

TEA CULTIVATION IN INDIA

TEA is the seventh largest foreign exchange earner and from a total acreage of 400,000 hectares, 667 million kgs of tea is produced annually. R&D support towards the industry has been able to boost up the yield from 373 kg/ha in 1890 to 1643 kg/ha in recent years.

TEA endows to India the privilege of being the largest producer country in the world.

TEA — cultivation on a commercial scale in INDIA started its long-march in 1830s from the Assam valley and has gradually spread to Doors, Terai, Darjeeling and Tripura in the north/north-east and to hilly tracts of Tamilnadu, Kerala and Karnataka in the South.

In North & North-east: Tea is mainly grown in the valley of Assam, Cachar & Kangra, Dehradun, Almorah, Garwal, Mandi & Ranchi. The tea grown in Daneeling at high altitudes is considered to be the best in flavour. The total acreage is about 3,25,000 hectares producing 527 m.kgs.

In South India: Tea is grown in hilly slopes of Western ghats at an altitude of 1,000 m. to 1,600 m. The principal areas of cultivation are Nilgiri Hills, Annamalai Hills, South Travancore, Peermade plateu and small areas of Coorg and Mysore. The total acreage in South is 75,000 hectares with the production of 140 m.kgs. annually.

Tea Plantation in Kotagiri, Nilgiris

WHY MULBERRY

ROLE OF SHADE TREES IN TEA PLANTATIONS:

Shade trees are an integral part of the tea cultivation, especially so for the plains of the North and drought prone areas of the South. The shade trees are advantageous because they:

- *reduce radiation injury*
- *minimise drought*
- *serve as windbreak*
- *regulate temperature*
- *lessen pest incidence*
- *increase soil fertility*
- *generate additional income.*

presently, trees of *A. chinensis, A. odoratissima, Indigofera teysmanii* in the plains of North-East India and Grevillea *robusta, Erythrina indica* at lower elevations in South India have been found to be effective as shade trees. Pears and oranges are also used sometime as shade trees.

Desirable characters of good shade tree

- ★ *Easy to propagate/quick growing*
- ★ *Deep rooted*
- ★ *Good canopy, providing filtered shade*
- ★ *withstand frequent looping*
- ★ *tolerance to wind & frost.*
- ★ *less pest & disease incidence*
- ★ *preferably evergreen*

S A SHADE TREE ?

PLANTING MULBERRY IN TEA

Mulberry is a hardy plant capable of growing both in acidic and alkaline soils. The soil pH can be adjusted by Dolomite/lime and Gypsum in acidic and alkaline conditions, respectively. Mulberry thrives well in low (20") as also high (160") rainfall areas. In essence, it has the capacity to withstand a wide range of eco-climatic conditions.

Mulberry is basically a perennial tree originated from the foothills of *Himalayas* bordering India and China. As it fulfils almost all the requirements of a good shade tree it can naturally be taken as an alternative to the existing shade trees. The most important additional advantage of mulberry as shade tree is that while the other shade trees can generate additional income by way of timber, fuel and fruits, mulberry can help produce SILK, which itself is a foreign exchange earner!

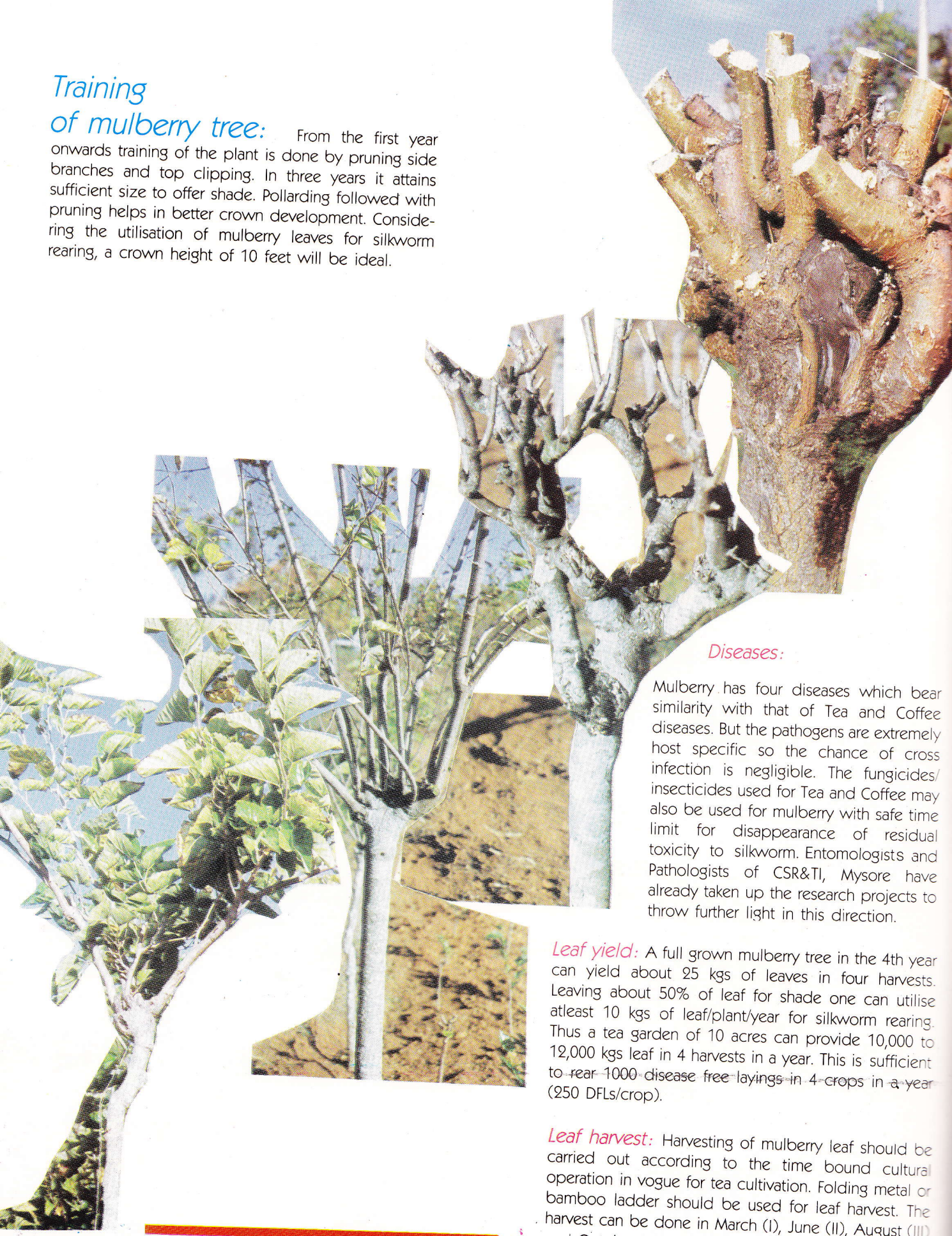
Variety: Kanva2, MR2 or S54 can be used successfully. 6–8 months old saplings are to be planted in pits of size 2′×2′×2′. The pits are to be filled up with 10 kgs of farmyard manure/compost. Planting during monsoon is advisable. Depending on the season of planting, pot watering for first 10–15 days helps in the establishment of the plants.

Spacing: Planting of Mulberry saplings along with Grevillea trees at a spacing of 20"×20" is proposed. In new areas where tea planting is being taken up, planting may be done with or without Grevillea. At the rate of 109 trees/acre there will be 1090 trees in 10 acres of plantation.

Tribal tea planters of Banagudisolai

Training of mulberry tree:

From the first year onwards training of the plant is done by pruning side branches and top clipping. In three years it attains sufficient size to offer shade. Pollarding followed with pruning helps in better crown development. Considering the utilisation of mulberry leaves for silkworm rearing, a crown height of 10 feet will be ideal.



Diseases:

Mulberry has four diseases which bear similarity with that of Tea and Coffee diseases. But the pathogens are extremely host specific so the chance of cross infection is negligible. The fungicides/ insecticides used for Tea and Coffee may also be used for mulberry with safe time limit for disappearance of residual toxicity to silkworm. Entomologists and Pathologists of CSR&TI, Mysore have already taken up the research projects to throw further light in this direction.

Leaf yield: A full grown mulberry tree in the 4th year can yield about 25 kgs of leaves in four harvests. Leaving about 50% of leaf for shade one can utilise atleast 10 kgs of leaf/plant/year for silkworm rearing. Thus a tea garden of 10 acres can provide 10,000 to 12,000 kgs leaf in 4 harvests in a year. This is sufficient to rear 1000 disease free layings in 4 crops in a year (250 DFLs/crop).

Leaf harvest: Harvesting of mulberry leaf should be carried out according to the time bound cultural operation in vogue for tea cultivation. Folding metal or bamboo ladder should be used for leaf harvest. The harvest can be done in March (I), June (II), August (III) and October-November (IV)

COFFEE PLANTATIONS

In India coffee cultivation is mostly confined to Western and Eastern ghats. However, the whole of South West abd North East monsoon tracts are suitable for coffee cultivation. This includes the states of Karnataka, Kerala, North Eastern India, Sikkim, West Bengal,Maharashtra, Tamilnadu, Andhra Pradesh and Orissa.

The total area under coffee cultivation amounts to 2,11,344 hectares and the expected coverage by 2000 AD is 3.0 lakh hectares. The annual production is 1.5 lakh tonnes of which 70% is produced in Karnataka. India has 99,900 registered coffee growers of whom more than 97% are having holdings of 10 acres or less.

Coffee Plantation in shade

SHADE MANAGEMENT IN COFFEE PLANTATION

Shade management is an essential part of the coffee plantation. The most popular permanent shade trees belong to the Indian fig and legume families having timber values. However, most commonly used shade plant is Dadap *(Erythrina litosperma)* and the next most popular one is silver oak. The positive aspects of shade trees are:

- *better conservation of soil moisture*
- *reducing water loss through transpiration*
- *shading from undue exposure to sun*
- *reducing weed growth*
- help *maintain the longevity of plants*
- *increase in the yield*

MULBERRY CULTIVATION WITH COFFEE

As detailed earlier, mulberry tree fulfils the basic requirements of a shade tree. Thus in coffee also mulberry can be grown more profitably.

In coffee garden, about 8 months old saplings of mulberry can be planted at 15'×15' spacings in pits of size 2'×2'×2' as suggested for tea. Thus a garden of 10 acres can accommodate 1940 mulberry trees (194 trees/acre)

Leaf yield: Based on the estimate presented earlier, it can be deduced that in coffee plantation, mulberry can yield about 5000 kgs of leaf/acre annually. Leaving 60% of leaf for shade (as coffee requires more shade than tea) 2000 kgs of leaves can be harvested in 4 crops in a year for silkworm rearing and this can support rearing of 200 dfls. Thus in 10 acres of coffee garden, 20,000 kgs of leaf can be obtained annually for rearing of 2000 dfls (500 dfls × 4 crops).

The frequent failure of coffee crops due to drought in southern belt makes the prospect of integrated mulberry cultivation more attractive for coffee growers.

Improved bivoltine cocoons CC_1

Rearing with bamboo trays

TEA & COFFEE BELT: IDEAL HOME FOR BIVOLTINE SILKWORM

The ecoclimatic conditions prevalent in tea and coffee belts are ideally suited for bivoltine silkworm rearing. Furthermore the infrastructure available in Tea and Coffee plantation can reduce the initial investments necessary for mulberry cultivation and silkworm rearing. Looking into the aspects of sericulture development in the country, increase in the production of bivoltine silk is an important step. Thus all efforts should be made to introduce silkworm rearing in integrated way with Tea and Coffee cultivation.

Central Silk Board can ably guide in this venture through its research institutes in South, North and North, East regions of the country.

FOCUS ON SILKWORM REARING

Silkworm is a sericigeneous insect having larval life of about 26 days and except in places of extreme winter, it is possible to rear silkworm around the year. The introduction of the concept of distribution of chawki reared worms after second moult has further simplified the rearing for new entrepreneurs. However the maintenance of hygienic conditions, regulation of Temperature, humidity and feed are the important aspects of rearing to harvest bumper cocoon crops.

Facilities such as rearing space and labour force are already available with coffee growers and for tea growers only rearing accommodation need to be provided.

Leaf Chopping for chawki worms

MATERIALS REQUIRED FOR REARING

250 BIVOLTINE DFLS PER CROP

	Nos.
1. Bamboo rearing trays (3 1/2′ dia) @ 40 trays/100 dfls	100
Feeding stands-2/100 dfls.	2
Rearing stands (wooden) @ at 10 trays/stand	10
Chandrikes (6 1/2′ × 4′ @ 40/100 dfls	100
Leaf harvesting baskets @ 4/100 dfls	10
Leaf chambers	2
Hygrometer (Wet and Dry)	1
Gator sprayer	1
Chopping knife	2
Chopping boards	1
Gunny cloth	25 mts
Formalin (38%)	10 Lts
Room heaters	4 Nos

2. Rearing space: Rearing hall of size 16′×30′ can accommodate rearing of 250 dfls.

Box Rearing

Cocoons on bamboo mountage

ECONOMICS

The facilities available in Tea or Coffee plantations like labour, space for rearing and appliances are adequate to take up sericulture. Only items like trays, stands and chandrikes need to be procured. Maintenance of mulberry trees can be done along with the cultural operations for Tea or Coffee. The actual expenditure is much less than what is shown under different items below:

TEA PLANTATIONS: 10 ACRES

I. EXPENDITURE

1.	Preparation of pits, 1090 numbers in 10 acres @ 20 pits per man day, needs 55 man days @ Rs. 20/ man day = 20 × 55	Rs. 1,100.00
2.	Depreciation + interest on rearing equipment	Rs. 1,000.00
3.	Depreciation on rearing building	Rs. 1,000.00
4.	Manure and Maintenance of trees can be done along with cultural operations for tea at no extra cost	
5.	Labour charges: Man days required to rear 250 dfls at a time including leaf harvest = 75 for 4 crops 4×75 = 300 Man days @ Rs. 20 per man day	Rs. 6,000.00
6.	Miscellaneous: Cost of layings, *etc.*	Rs. 500.00
	TOTAL	Rs. 9,600.00

II. RETURNS

Cocoon yield @ 40 kgs/100 dfls
for 1000 dfls = 400 kgs
@ 50/kg = 400×50 **Rs. 20,000.00**

A net profit of Rs. 1,000/- per acre can be realised through sericulture. Since the leaf yield increases with the aging of the plant, the rearing capacity also increases which will enhance the income manifolds.

Mulberry planted with coffee in Nilgiris

COFFEE PLANTATIONS: 10 ACRES

I. EXPENDITURE

1. Preparation of pits, @ 20 pits per Man day
   Man day required for 10 acres to make 2000 pits = 100 Man days at Rs. 20/- Man day = Rs. 2,000.00
2. Depreciation + interest on rearing equipment Rs. 2,000.00
3. Depreciation on rearing building Rs. 2,000.00
4. Manure and Maintenance of trees can be done along with cultural operations for coffee without additional expenditure
5. Labour charges:
   Man days required for rearing 500 dfls at a time including leaf harvest
   @ 150 Man days/crop =600 Man days for four crops @Rs. 20/- per man day
   600 × 20 = Rs. . 12,000.00
6. Miscellaneous: Cost of layings, *etc.*, Rs. 1,000.00

TOTAL Rs. 19,000.00

II. RETURNS.

Cocoon yield @ 40 kgs/100 dfls for 2000 dfls = 800 kgs @ Rs. 50/kg = Rs. 40,000.00

Minimum net income of Rs. 2,000/- per acre is possible through sericulture. With the increase in the age of the trees the leaf yield also increases and the returns multiply.

FUTURE PROSPECTS OF RESEARCH

The integrated approach towards introducing mulberry sericulture in tea and coffee plantation has not only opened new vistas of increasing developmental scope for the country but also opened new avenues of research. It should be accepted that every industry as it grows, it creates new problems too. But that never deters the growth of the industry if due attention is given towards the R&D organisation.

Central Silk Board along with the research establishment of tea & coffee industry can duly attend to the problem which may be faced on the way.....

MULBERRY TAKING ROOTS AS SHADE TREE IN NILGIRIS.....

Sri Samuel Mohan, one of the well known tea planters of Coonoor, Tamilnadu has taken up mulberry sericulture integrated with the tea. He has planted mulberry as shade tree in 8.0 acres of tea plantation. He has also agreed to plant mulberry saplings in 60 acres of tea plantation in Kothagiri and the planting is expected to be completed by August 1987.

Sri Mohan has also developed 0.5 acres of mulberry under regular plantation. Using the leaves from this regular plantation along with marginal amount from mulberry shade trees, Sri Mohan has raised one crop of bivoltine (NB_4D_2) during May–June, '87.

Actual Yield (Kg)	Yield/100 dfls (kg)	Rate Rs./Kg	Actual return
31.1	51.8	105.55	2807.60 (for 26.6 kg)

CSR&TI, Mysore has developed 0.5 acres of mulberry plantation in an UPASI controlled social upliftment unit. Two rearings have been done under the guidance of extension staff of RSRS, Coonoor. Results are highly encouraging. The races NB_{18} and Kalimpong A were respectively used in February–March and April–May, 1987.

Dfls reared	Actual Yield (Kg)	Rate Rs./Kg	Actual Return (Rs.)
45	33.8	66.5	2038.00
40	20.2	81.40	1644.30

IMMEDIATE REQUIREMENT OF MULBERRY SAPLINGS IN NILGIRIS

NAME/VILLAGE	SAPLINGS SUPPLIED
REGULAR PLANTATION	
Mr. A. Johi, *Bettati*	2000
Adivasi Society, *NAWA*	2500
NAWA, *Kolithorai*	2500
Mr. C. Martin, *Kottakombai*	1000
Mr. R. Raju, *Hosahatti*	1500
Mr. H. B. Ramachandra, *Karadipallam*	1000
IN TEA/COFFEE PLANTATION	
Mr. J. Bhojan, *Thumboor*	2000
Mr. T. K. Bheemagowda, *Thappa Kombai*	2000
Mr. M. Arumugum, *Aravenu*	2500
Mr. T. S. Joheegowda, *Kilipi*	2000
Mr. K. J. Shivaraman, *Kodamalai*	1500
Mr. Y. B. Ranganathan, *Nadgula*	2000
Mr. S. Holdorai, *Kodamalai*	3000
Mr. K. M. Bellai, *Kerbenu*	500
Mr. J. Suresh Babu, *Arvana*	4000
MR. J. Ravi, *Arvana*	4000
Mr. J. Raju, *Thappakombai*	2500
Mr. T. Babu, *Thappakombai*	2000
Mr. M. Gopal, *Thappakombai*	2000
Mr. L. Bellan, *Thappakombai*	2500
Mr. H. Hillan, *Pudiyangi*	1000
Mr. Pandurangan, *Anikatti*	1000
Mr. G. L. Raman, *Gundada*	1500
Mrs. Luies, *West Brook*	8000
Mr. Velayudan, *Kottakombai*	800

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