SOME ASPECTS OF TEA CULTURE IN SOUTHERN INDIA

R. L. de Silva & S. P. Vytilingam*

Introduction

Tea planting in Southern India commenced in the Nilgris about 110 years ago. By 1890, about 8,600 acres had been planted, and in 1927, the area under tea is recorded as 116,000 acres. At present, the tea areas in Southern India cover about 186,000 acres as compared with about 591,000 acres for the whole of Ceylon. The approximate tea acreages and the elevations of the various districts are given in Table 1.

TABLE 1—*The acreages and elevation ranges of the tea districts of Southern India*

State	*District*	*Elevation Range* (Feet above mean sea level)	*Area* (Acres)
KERALA	Central Travancore and Mundakayam	650 — 5,400	38,000
	Cochin	3,000 — 3,500	2,500
	High Range (Kanan Devans)	2,500 — 7,500	33,700
	Malabar	200	1,400
	Malabar-Wynaad	200 — 5,750	13,600
	South Kerala	400 — 3,500	11,700
MADRAS	Anamallais	3,000 — 5,000	25,700
	Kanyakumari	200 — 3,000	1,120
	Madurai	1,000	1,750
	Nilgiris	3,500 — 8,050	33,150
	Nilgiri-Wynaad	2,500 — 8,100	14,800
	Tirunelveli	1,500 — 4,000	1,100
MYSORE	Coorg	2,700	450
	Mysore	2,500 — 4,250	4,200

* Dr R. L. de Silva represented the Tea Research Institute of Ceylon and Mr S. P. Vytilingam of Kirimetiya Estate, Galaha, represented the Board of Control of the TRI, at the 72nd Annual Conference of the United Planters' Association of Southern India, held in Coonor on the 6th September, 1965. They also visited several tea estates in Southern India.

Climatic conditions

Temperature—Temperatures are generally higher in South India than those in Ceylon at a particular time of the year, for similar elevations. These differences, however, become almost negligible during the period December to February inclusive.

Rainfall—As in Ceylon, there are two monsoons, the South-West and the North-East. The majority of the tea estates receive the bulk of their rainfall during the South-West monsoon, and very little or none during the North-East. The average rainfall in low-elevation estates ranges from 50-80 inches per annum, and is poorly distributed. Most of them have, therefore, to contend with a severe drought period, which can be more prolonged than the droughts experienced in the Uva districts of Ceylon.

There is much variation in the average rainfall in high-elevation estates—*viz* from 50 to 350 inches per annum. The difference between the average annual rainfall on one estate situated 6,000 ft above sea level in Kerala and another estate at the same elevation but only four miles away as the crow flies was 180 inches.

Frost—Most estates having fields above an elevation of 7,000 ft suffer repeatedly from severe frost damage in particular pockets.

Type of Tea

Most of the tea is of mixed seedling origin ranging from true China, (the appearance of which could easily be mistaken for severe symptoms of phloem necrosis virus disease) to pure Assam (where leaves sometimes measure more than one foot in length). Vegetatively propagated tea, whilst becoming increasingly popular, is still not being planted on a scale comparable with Ceylon. Estate units are usually larger than those in Ceylon.

Yields

Average yields on estates are of the order of 1,000 lb made tea per acre per annum. Some estates claim yields up to 2,000 lb per acre in spite of their having a high proportion of China tea which seems to yield remarkably high when compared with China tea in Ceylon. The highest yields from VP tea are in the region of 2,000-2,500 lb per acre, and have not given such spectacular results as obtained in the low country in Ceylon. In this connexion the comments on harvesting (see below) should be considered.

Cultural operations

Harvesting

Harvesting in many estates is carried out using shears. It is, therefore, difficult to compare yields per acre in South India with those obtaining in Ceylon where the shoot (two leaves and the bud) is hand picked. On estates around 6,000 ft in elevation, 14-day harvesting rounds are maintained during periods of good weather for growth. This period is shorter at lower elevations. Shear plucking is largely indiscriminatory. Samples of leaf taken from withering units were examined and found to contain shoots with 1 to 6 leaves. Immature leaf was present in abundance, as were also cut portions of leaves, both immature and coarse. The stalk content of shear-harvested tea seems to be higher than in hand picked tea. In young fields where plucking tables are maintained rather low, weeds often penetrate the table and are removed during shearing together with the tea flush. The weeds are required to be subsequently removed by the harvesting labourer. This is done with varying degrees of efficiency.

The advantages of shear plucking are reflected chiefly in the reduction of labour costs. Some estates using shears had excellent 'slopes', although the precise advantage of these remains somewhat conjectural. Various models of shears are available, some being manipulated with only one hand because an extension of one of the shear handles fits onto the labourer's forearm. Most of the shears are of the straight forward hedge-cutter type. All models have a small plastic bag supported on an iron frame mounted onto one of the cutting blades so that the chopped flush is pushed into the bag. The harvesting labourers carry the familiar basket on their backs into which the contents of the small plastic bags are periodically emptied. Both coir bags and jute sacks are used for the transport of leaf by lorry to the factory; but coir bags seem to be more popular.

Pruning

Pruning cycles are generally longer than those employed in Ceylon at comparable elevations. In high elevations, clean pruning is carried out, whereas at lower elevations the bushes are cut across fairly high. In high elevations, the pruning might be described as 'harder' than is generally done in the Nuwara Eliya district. Many estates cover pruning cuts with bituminous paints to minimize scorch and wood-rot. Pruning during dry weather is strongly discouraged.

Fertilizers

Quantities of fertilizer applied are tremendously variable on different estates. It is significant that in general the quantity and frequency of application of fertilizer are lower than in Ceylon for tea of comparable yields. Before we draw any conclusions from this, it must be remembered that the plucking standards are so variable in the two countries. Forking in of fertilizer is widely popular. In some areas forking is done once, in others twice, and rarely thrice a year. Many estates apply fertilizer twice a year, but there are still a considerable number of estates which do this only once in a year. It was rare to find an estate applying fertilizer more than four times in a year even on VP tea.

Shade

Shade is provided by various tree species, largely *Grevillea robusta* which are lopped once a year to provide mulch. The stand of shade seems variable, and its density in different areas could not be correlated with environmental conditions. It seemed to be rather more governed by personal preference. On some estates *G. robusta* was used as wind breaks. *Erythrina lithosperma* (dadap) trees are grown up to 5,000 ft in elevation. The thorny dadap (*Erythrina crista-galli*) is grown upto elevations of 6000 ft in certain districts. *Alnus nepalensis* is also planted at high elevations. In particular districts above 6000 ft *Acacia* sp become more popular. (Species commonly used are *A. elata* and *A. pruinosa*).

Soil conservation

Most estates do not do clean weeding with the intention of minimizing soil erosion. (The economics of not weeding is, however, quite another matter). Trenches such as are dug in Ceylon tea fields are rare in South India. The argument has been advanced that because no disturbance of the soil is taking place, erosion is minimized and the necessity for having silt pits does not arise. It would seem that this would benefit estates with little rainfall, but would hardly seem to be valid in estates which receive more than 200 inches of rainfall a year. Some estates in the Kotagiri area had excellent terraces constructed on steep slopes in order to minimize soil erosion. The construction of terraces was, however, the exception rather than the rule on South Indian tea estates.

Weed control

Many estates do not remove weeds during the 1st year of the pruning cycle in mature tea or in new clearings, on the grounds that soil erosion is minimized by the presence of weeds. Some estates do manual weeding but with a minimum of soil disturbance. The use of Gramoxone is becoming increasingly popular.

Nurseries

Nurseries are managed with great care and efficiency. Their extent on different estates is variable, the largest nursery visited by us covering more than 15 acres. Nursery technique follows the Ceylon pattern closely. High shade is very popular, and wherever it is used, it is usually combined with fern shade to minimize the damage caused by dripping water during the callusing stage. Polythene covers are sometimes used to cover whole nursery beds (similar to the low shade obtained by using coir matting in Ceylon) in order to keep cuttings in a humid and warm atmosphere and eliminate the necessity to water them frequently. Some estates have, however, abandoned this practice because they feel it slows down the growth of the cuttings. Fumigation of nursery soil by heat is a common practice in areas infested with root-knot nematodes.

Diseases

Blister blight

Nickel chloride hexahydrate is being widely used for the control of Blister blight (*Exobasidium vexans* Massee). It is somewhat cheaper than copper fungicides and much more readily available in India because of import restrictions. In order to facilitate spraying and for greater efficiency, fields in the last year of the pruning cycle often have narrow lanes cut through them, between every 5 to 10 rows of bushes so that the spraying labourers can circulate through the fields with ease. Some managers were of the opinion that the loss in crop resulting from the removal of some of the branches in providing lanes, was more than offset by the increases in crop obtained by more efficient distribution of the fungicide spray. Concrete evidence is, however, lacking.

Root Diseases

The fungi *Armillaria mellea* Vahl, *Fomes noxius* Corner, *Poria hypolateritia* Berk., *Rosellinia arcuata* Petch and *Ustulina zonata* Lev. are all present in tea in Southern India. Soil fumigants are not widely popular for the control of these diseases, which are usually treated by the old method of uprooting the diseased bushes manually, with cleaning out of the infected material. Recently, a few estates have begun using soil fumigants.

Stem Diseases

Die-back of shoots caused by the fungus *Leptothyrium theae* Petch accounts for some post-pruning damage on high elevation estates. Control is effected by drench spraying the pruned frames with copper fungicides.

Recently a new disease has been found in old seedling tea at high elevations (6,000 ft) where severe cankers appear on the stems and branches of affected bushes. The causative organism has not yet been identified. Symptoms are often similar to those caused by the fungus *Phomopsis theae* Petch on VP tea in high elevations in Ceylon (Shanmuganathan 1965). It is thought that the new disease is quite distinct from that caused by the fungus *Hypoxylon serpens.*

Pests

Nematodes

Nursery plants are often damaged by root-knot nematodes of which *Meloidogyne incognita* and *Meloidogyne javenica* are serious pests. The root-knot nematode of mature tea (*Meloidogyne brevicauda*) which is present in Ceylon has been found to cause some damage to tea in Southern India as well. The meadow nematode (*Pratylenchus loosi* Loof) which causes widespread damage in Ceylon is unknown in Southern India.

Acarids

Purple mites (*Calacorus carinatus*) cause serious damage to tea in Southern India, but are fortunately not a problem in Ceylon. The earlier indication that copper fungicide sprays used for the control of Blister blight might stimulate the build up of purple mite populations (Venkata Ram 1963) has apparently not been confirmed because only inconclusive evidence is available. Kelthane is widely used for the control of purple mites. Scarlet and yellow mites are not a serious problem in Southern India.

Insects

Thrips are a major problem in tea in Southern India, and some estates use organo phosphates to control them. The consequences of using dieldrin against Shot-hole Borer are rather different from those encountered in Ceylon. Flush worms seem to appear there instead of Tortrix.

Manufacture

Withering

Most factories were originally built to cope with yields of 600-700 lb made tea per acre per annum. With subsequent increases in yields, withering space has become quite inadequate. Hessian tats are used in the majority of factories. None of them use tats made of nylon or other artificial fibres because it is argued that the use of these materials would only increase withering space to a limited extent and the increased capacity achieved does not justify the high initial expense involved, even though the nylon tats may last twice as long.

The majority of estates, are, therefore, installing withering troughs. Some troughs are built on the Wilken Woods design, but others are constructed at a considerably lower cost, of cheap materials such as plywood, timber and asbestos sheeting. Certain troughs have reversible fans. Some have a honeycomb type wire mesh to support the leaf, but this is being discarded because it is said to cause too much injury to the shoots while handling. Sometimes hot air from the bulking chamber is fed into the troughs, whereas other troughs do not use any conditioned air. Soft withers are generally employed, the period of wither being 18-20 hours. Independent heat exchangers are not used with most troughs in many factories. Some troughs are fitted to take in hot air from the drier exhaust through a duct. Troughs vary in length from 48 ft to 80 ft, but are usually 6½ ft wide and 2½ ft deep. The capacity of the troughs range from 1500 lb to 5000 lb of withered leaf, depending on trough dimensions. Some estates use a withered leaf sorter for removing grit; others use a magnetic sifter for removing metal particles.

Rolling

Rolling in some factories is done exclusively with orthodox rollers. Rotorvanes are becoming increasingly popular, very much more so than they are in Ceylon. Both the 8 inch and 15 inch models are in use, some factories having both types. Certain estates use CTC rollers, even in combination with Rotorvanes, but none of the factories visited by us used ball breakers in conjunction with Rotorvanes. Rotorvane rolling programmes are variable. Three typical programmes are given below.

Programme 1

1 – Orthodox rolling is done for 30 minutes with either light pressure or none at all. (Estimates of pressure are rather unreliable, and often varies considerably from one batch of leaf to the next.) This roll is called a 'condition roll', because it is said to produce some twist in the leaves before it is fed into the Rotorvane.

2 – Pass through Rotorvane

3 – Roll-break (No 4, 5, 6 or 7 meshes are used largely based on personal preference. (Usually Nos 4 & 5, 5 & 6 or 6 & 7)

4 – Big bulk is passed through the Rotorvane a second time and sometimes three or even four times.

Programme 2

1 – 'Condition roll'—30 minutes

2 – Roll break

3 – Big bulk is passed through the Rotorvane

4 – Roll break

5 – Orthodox roll for big bulk

6 – Second orthodox roll for big bulk.

Programme 3

1 – 'Condition roll'—30 minutes

2 – Pass through the Rotorvane *twice without* roll breaking

3 – Orthodox roll for 20-30 minutes

4 – Roll break only at this stage.

Occasionally the CTC and Rotorvane are used in combination in different ways. One popular programme is summarized below :

1 – One pass through the Rotorvane

2 – The CTC is used for *three* successive cuts

3 – Roll-breaking is done at this stage

NB—No orthodox rolling is done in this programme.

Fermentation

Some estates use fermenting troughs. These are similar in design to withering troughs. The leaf is placed in trays, the bottom of which are made of wire mesh. The trays are then loaded on to the trough and fit tight there. The troughs are 30-50 ft long. In some estates warm air from the bulking chamber is fed into the trough through a duct. The temperature of the trough in one factory (elevation 5,500 ft) was 80°F.

Firing

Driers are similar to those used in Ceylon.

Stalk extractors

Single roller Shizouka type stalk extractors are used in some factories. Others use BBT* electrostatic stalk extractors which have three plastic rollers which become charged with static electricity as a result of being rubbed with felt. There seems to be little evidence that choice between them is based on experimental results.

Markets

About 30% of the production is sold at the London auctions, while about 50% is offered at Cochin. A quarter of the teas sold in Cochin are resold abroad to continental Europe, Australia and the Middle East. Some off-grades, mainly dusts, are sold at Tiruchirapalli for local consumption. It is of interest to note that dust grades have a great demand for local consumption and sometimes, dusts account for as much as 45% of the total break.

The quality season is from November to January inclusive. Prices in general are lower than those obtained for comparable grades in Ceylon. The most obvious point that is evident as a possible cause, is the great difference in standard between the indiscriminatory shear harvesting done in India, and the highly selective hand picking that is the normal practice in Ceylon.

Labour

Labourers are paid less than those in Ceylon. The rate of pay for a male is Rs 2.01 per day. No subsidized food rations are given to labour by the estates. Trade Unions are well organized.

Research

The United Planters' Association of Southern India has established a new research station at Cinchona (elevation 3,500 ft) in the Anamallais district. The station is financed by voluntary subscriptions from estates on the basis of Rs 1/- per acre per annum. The Station retains the services of a Chief Scientific Officer, a Plant Pathologist, a Technologist, an Entomologist, a Chemist and a Plant Propagation Officer. Research workers do advisory work as well. The new station has, besides its laboratory, 4 senior and 3 junior staff bungalows but no factory. A few acres of VP tea have been planted and will shortly be available for experiments. There is no seedling tea in bearing available for field experimentation. Most estates follow closely the recommendations made by the UPASI Scientific department and the Tea Research Institute of Ceylon.

* The Bombay Burmah Trading Company are the manufacturers.

One tea Company which manages about 28,000 acres of tea has its own Scientific Officer and Vegetative Propagation Officer. They also have their own laboratory experimental tea and nursery. Other companies are said to be getting interested in following their example.

Acknowledgements

The authors wish to thank the United Planters' Association of Southern India for their kind invitation to visit South India and for the generous hospitality shown to them by the members of the UPASI. In particular they wish to acknowledge the assistance rendered to them by Dr K. S. Venkataramani, Chief Scientific Officer, UPASI, Dr C. S. Venkata Ram, Plant Pathologist, UPASI, Mr N. H. Sethna, Chairman, Tea Product Sub-Committee, UPASI, the Managing Director, Scientific Officer and Staff of the Kanan Devan Hills Produce Company Ltd and Mr Frank H. Kehl. They are much obliged to the Managers of all the estates they visited for their co-operation and hospitality.

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