

# The Tea Research Institute of Sri Lanka

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The Tea Research Institute was founded in 1925 in accordance with the provisions of an Ordinance passed in the Legislative Council of Ceylon.

The Institute was set up for the purpose of research into and investigation of all problems and matters relating to tea, and the provision and publication of information relating to it. The TRI is financed entirely by the Tea Industry through a cess levied on tea exported. The Institute is managed by the Sri Lanka Tea Board.

## Research organisation

The main laboratories of the TRI are situated at St. Coombs, Talawakele, and are well equipped for basic scientific research, as well as applied research in Agricultural Chemistry, Agronomy, Entomology, Nematology, Plant Biochemistry, Plant Breeding, Plant Pathology, Plant Physiology, Plant Propagation and the Technology and Biochemistry of the manufacture of tea. There is also a Statistics Division which collaborates with the other research divisions, particularly in field experimentation. In addition to the central research organisation at Talawakele, the Tea Research Institute has outstation establishments situated in Ratnapura, Kandy, Uva and Galle districts which cater to special problems arising in these planting districts.

## Research accomplishments

Since its establishment, the Tea Research Institute has to its credit many outstanding contributions to the industry. Many pests and diseases of tea have been successfully controlled. An important finding in this field was the control of the leaf-eating caterpillar, Tea Tortrix. Control was effected by intentionally spreading a parasite, *Macrocentrus homonae*, introduced from Java. This biological method of control, to this day, remains as one of the Institute's greatest achievements. A further development in the management of this pest was by evolving methods to monitor its activity in the field. This was made possible by the successful isolation, identification and synthesis of the sex pheromone of the female moth. The synthetic pheromone serves as a bait

to attract male moths and by such surveillance techniques it is now possible to curtail on the unnecessary use of insecticides.

An integrated approach towards pest control is currently being adopted on tea estates thus minimising the use of chemicals. Programmes based on pruning practises and other cultural practises have been evolved to manage two of the major pests of tea namely, Low-Country Livewood Termite and the Shot-hole Borer. By evolving strategies based on cultural practises it has now become possible to totally eliminate the use of insecticides against these pests.

Perhaps the greatest service that the Institute rendered to the industry was the control of the Blister Blight leaf disease which afflicted many tea plantations in Sri Lanka. The successful control of Blister Blight saved the industry from extinction and is a classical example of the benefits accruing to an industry through research.

Recommendations for the control of Poria and other major root diseases by soil fumigation with methyl bromide enabled many estates which grappled with these problems for many years, to eradicate them altogether.

The Institute has also advised the industry on various cultural practises such as proper fertilizer application and better techniques of management, which have led to increased production.

Synthesising the information available from experiments on fertilizer carried out over the past 50 years, the Institute has made comprehensive recommendations on all aspects of fertilizer usage. These recommendations were based on the potential yield realisable from various types of tea in the different districts.

Studies on the use of urea have shown that this relatively cheaper source of nitrogen could meet up to 50 per cent of the nitrogen requirement of

the tea industry. Studies have also shown that the local phosphate deposits at Eppawela is a suitable substitute for imported rock phosphate, thus saving Rs. 15 million in foreign exchange annually.

The discovery of potash deficiency in 1953 and zinc deficiency in 1962 and measures for the correction of these deficiencies were important findings. For instance, the correction of zinc deficiency by foliar application of zinc sulphate led to appreciable increases in yield at a comparatively low cost. The value of the increased yields that are obtained each year as a result of correcting these deficiencies would be many times the annual cost of maintaining the Institute.

A large number of herbicides have been experimented with over the years and estates were given precise recommendations on how to handle these chemicals and develop suitable programmes of weed management. An outstanding development in this line was the discovery that *Panicum repens* could be successfully controlled with glyphosate.

Extensive research work was undertaken on soil conservation and improvement. Various measures have been recommended to estates and increased emphasis was given to the construction and maintenance of drains and terraces for soil conservation, soil reconditioning before replanting, mulching and the planting of *Eragrostis curvula* on banks in order to minimise soil erosion.

Pruning is the most crucial operation that the tea plant is subjected to, and most deaths of plants occur following pruning. Much research effort has been concentrated on understanding the physiological and biochemical changes taking place at pruning and the Institute's recommendations to estates are based on these studies.

Vegetative propagation of tea which was pioneered and developed by the Institute has provided the industry with the means for rapidly increasing the production on an unit of land, and consequently lowering the cost of production. Whereas, the average estate yield is under 1,000 kg made tea, yields of over 4,000 kg made tea have been obtained on commercial estates with the outstanding TRI 2020 series of clones. The advent of the recently developed TRI 3000 series clones offer the promise of even higher yields.

There have been many contributions to our knowledge of the biochemistry of the tea plant and of these, the more important ones include work on chemical changes during pruning, and during the manufacture of tea, the extraction and purification of tea seed oil, caffeine, tea saponins and a variety of other compounds. An outstanding contribution has been made to our knowledge

of the constituent chemicals associated with the quality, strength and the aroma complex of tea.

Within the last 15 years, tea factories have been revolutionised. The major recommendations of the Institute have been the introduction of withering troughs, the introduction of the rotorvane, the introduction of CTP manufacture, the introduction of the Lawrie Tea Processor and most important of all the introduction of the Fluid Bed Drier, conceived, pioneered and commercially produced in Sri Lanka. The introduction of the Fluid Bed Drier to the industry has revolutionized the science and technology of tea drying, resulting in a 50 per cent saving on the energy used for drying.

The TRI kept abreast of changing market trends by developing processes for the manufacture of new tea based products such as instant tea, scented tea, liquid and carbonated tea and tea based wines and sherry. The processes have been developed up to the pilot scale of operation and are now ready for industrial exploitation.

The foregoing account is by no means an exhaustive catalogue of the Institute's achievements. Only the research that has led to concrete recommendations are touched upon, and here too, many have been omitted. In addition to this work, a large amount of information has been collected, which will be of use in the formation of future recommendations. Much of this information has been published in the Tea Quarterly and other journals.

### Current Research Programme

During the past few years the research effort of the TRI has been reoriented on the basis of a multi-disciplinary approach to the major problems confronting the tea industry. At present there are over 20 on-going research projects most of which have direct practical relevance to the industry. The projects include studies on cultivation practices, management of pests and diseases, development of improved planting material, improvement and maintenance of fertility and productivity of tea soils, optimization of agriculture within tea plantations including diversification of uneconomic tea lands into other crops, management of trees and shelter belts in tea fields, water management in tea, minimizing drought effects, weed management, weather/crop studies and on the manufacture side, continuous process for the manufacture of conventional black tea, development of new tea products and the utilization of waste products, study of the storage properties of tea, and the reduction in the cost of drying.

## Advisory and Extension Service

The TRI can be justly proud of its research achievements. These achievements, however, would be only of academic interest unless the practical recommendations which stem from research findings are conveyed to, and implemented on the estates. In order to disseminate the knowledge gained from research and to maximise the benefits from research to the industry the Institute has given the highest priority to its extension service. The Institute's staff maintains close contact with the planting community by way of correspondence, visits to estates, addressing planters' meetings, conducting field days, participation in symposia, conferences and exhibitions. Estate Superintendents are always welcome to visit the Institute and discuss their problems with the staff. The publication of the scientific journal *The Tea Quarterly*, Monographs, Advisory Pamphlets and Advisory

Circulars, etc., are other means of transmitting the recommendation of the TRI to the industry.

The over one hundred-year-old tea industry has for several decades been the mainstay of the Island's economy. The Tea Research Institute is conscious of its role and always endeavours to give of its best to this gigantic industry. Today, the industry is facing a crisis, and no doubt this would pose fresh problems. In the words of Sir John Russel, then Director of the Rothamsted Experimental Station, "As the economic conditions change and market demands alter, so the problems change, and as long as the tea growing industry continues, so long will it be necessary to maintain a Tea Research Institute with a highly competent staff to deal with the ever-changing problems as they arise".

