THE EARLY HISTORY OF THE TEA RESEARCH INSTITUTE OF CEYLON SOME PERSONAL RECOLLECTIONS

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The foundation of the Tea Research Institute marked both a beginning and an end. The application of scientific knowledge to Agriculture in Ceylon was the result of the coffee disaster when the young Cambridge botanist, Harry Marshall Ward spent two years (1880-1882) investigating the Coffee Rust Disease. This was a case of shutting the stable door after the horse had bolted, but one of the notable results was the subsequent recruitment of biologists to the staff of the Royal Botanic Gardens at Peradeniya. This team became the nucleus of an expanded staff when the Research Division of the Department of Agriculture was established in the second decade of the present century.

In the meantime the tea industry, as successor to the coffee industry, had found its feet and rubber had been introduced to Ceylon. The Research Division of the Department of Agriculture thus became deeply involved in the welfare of both these valuable crops. It soon became evident that, together with investigations on subsistence crops, the burden on the Peradeniya Research Station was too great, and the most promising solution was to create separate research institutes for the plantation crops, and let the Department concentrate on the other important sector, the subsistence crops. The Rubber and the Coconut Research Schemes were organized as adjuncts of the Department of Agriculture, but the Tea Research Institute from its inception was an independent corporate body, with its own revenue derived from an export cess on tea. The responsible trade associations : The Planters' Association, The Estates Proprietary Association, The Low-Country Products Association and the Ceylon Association in London, hammered out a scheme which was legalized and launched in 1925 by the passing of the Tea Research Ordinance through the then Legislative Council. Active in the promotion of the Institute were the Chairman of the Planters' Association (Mr J. W. Oldfield), the Director of Agriculture Mr (subsequently Sir) Frank Stockdale and Mr R. G. Coombe who was elected first Chairman of the governing body. For a time the Planters' Association acted as agents and Secretaries, and certain administrative arrangements were copies from Government Service, but in due course these arrangements lapsed.

By 1927 the Institute had a representative nucleus of staff. Mr Tom Petch who was for many years Mycologist and Director of the Department of Agriculture retired from those appointments and became the Institute's first Director. The Institute was fortunate to secure his services for a number of reasons. He was a scientist of international repute. The tea industry was already indebted to him for

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a standard work ' *The Diseases of the Tea Bush* ', which has never been superceded, and his knowledge of the agricultural situation in Ceylon was extensive. He set his staff a high standard in their work, by his own example, and by encouraging them to publish their investigations in internationally recognized scientific journals. At the same time he kept their feet on the ground, where the practical problems lay.

The first home of the Institute was in Nuwara Eliya in a bungalow within a stone's throw of Scandal Corner. The original staff in order of their appointment consisted of Gadd, Stuart Light, Evans and myself. We had very modest equipment, partly because we could not have used more sophisticated apparatus in the conditions prevalent in Nuwara Eliya. There was electric light, but no power. The petrol gas plant was operated by weights which had to be manually wound up like a grandfather clock. It would not operate round the clock and often-times, when some material had to be dried for an extended period, my last job at about 11.00 p.m. was to brave the South West Monsoon and go and wind it up. Unexpected snags arose. I had ordered a large copper drying-oven before I left England, and so of course knew nothing about the accommodation I could expect. It arrived at Nuwara Eliya by rail in a huge crate which could not be lifted off the wagon because there was no mobile crane at the goods siding. It took a fortnight of threats alternated with cajolery to get a crane sent up. Every scientist likes to have first-class equipment, but every scientist knows what good work can be done with apparatus improvized, not perhaps from sealing wax and string, but from a child's mechano set. My original shaker for soil suspensions was built around a bicycle wheel, and was powered by a small hot-air engine !

Despite primitive laboratory conditions sound foundations for future research were laid during the Nuwara Eliya period. Gadd was busy on fundamental studies of wood-rotting fungi and in studying a curious disease of seedling tea known locally as Bitten-off Disease. Light, who spent his time in Maskeliya, was attempting to control the tea tortrix depredations by biological control using an egg parasite, which proved unsuitable. Evans was familiarizing himself with the constituents of the tea leaf and working out reliable methods of analysis. I was discovering the differences in constitution and behaviour between temperate and tropical soils, and, what was more intriguing, trying to acclimatize myself to the thought of how on earth I was going to plan accurate field experiments on slopes like a house roof and irregular into the bargain. Having been loaned a couple of acres on Scrubs Estate I set out a compact block of 144 plots, the produce of which was plucked and weighed individually for 42 rounds in order to study the heterogeneity of both soil and bush. With a card table as base, a pair of kitchen scales, surveyor's umbrella, and suitable weatherproof garments, my technical assistant Mr M. Piyasena and I survived the buffetings of two monsoons and acquired a healthy respect for the tenacity of the Ceylon tea plucker.

St Coombs Estate

The Institute moved to its permanent location in 1930. By that time there had been several efforts to buy a suitable estate, but our requirements were not easy to satisfy. We needed mature tea for immediate experimental purposes, and also unopened land so that we could study planting operations from the earliest stage. St Coombs Estate was not in the market but the owners agreed to sell it for the good of the industry as a whole. The circumstances were somewhat peculiar. The oral tradition, which I can neither substantiate nor deny, is that St Coombs was formed by hiving-off a division of the adjoining estate, and that a dispute arose about boundaries. This dispute was settled by legal action but not before friction has reached such proportions that shot-gun patrols were in operation on the disputed frontier. The legal decision favoured St Coombs, but the losers owned the

land between St Coombs and the government cart-road, traversed by only one access road. This access was denied to St Coombs. Consequently no factory could be built and further opening of land was impossible. For years all leaf was head-carried to another estate for manufacture. When the Institute acquired the estate, normal relations were restored.

Until the Institute acquired its permanent home it had no real chance of settling down. Mr Petch had finished his specified term as Director in 1928, and for a year the Institute was in the acting charge of Gadd, and subsequently, owing to the incidence of leave, of myself. I handed over in 1929 to the new Director, Dr R. V. Norris who arrived in time to organize the smooth transfer to Dimbula. There were other changes in staff. Light left the Institute in 1929 and was succeeded by C. B. R. King. Evans had three years at St Coombs and then resigned to take up the profession of medicine. His place was taken by J. Lamb. F. R. Tubbs was a new appointment as Plant Physiologist and was the first staff inhabitant on St Coombs. From 1933 to 1948 the Institute had a stable staff, the only variation being the addition of T. E. T. Bond who was specially recruited to tackle the new Phloem Necrosis Disease. An equally stable technical and administrative staff came into being at this time. Until the outbreak of World War II, which temporarily deprived us of Tubbs, King and Lamb, the Institute had a closely-knit team, and this interval of time may be regarded as the flowering period of the developing research activities. The veterans of this period are A. H. B. Dias, P. A. John, V. Mendis, A. C. Perera, M. Piyasena and D. J. W. Ranaweera, all but two are still in harness.

The Early Problems

Once settled into St Coombs under the Superintendency of J. A. Rogers, the Institute's work expanded rapidly. The building of the factory was a landmark in tea research. With its full scale commercial side, plus a pilot plant for initial experimentation, the Institute had better facilities than any other tea research station. Before he left Evans had laid the foundations of the technological research which Lamb expanded with distinction. Evans studied the changes of leaf composition from plucking to plucking, and the effect of fertilizers on the quality of made tea, and started investigations on fermentation, firing and moisture content of tea, all of which were related to factory practice. Lamb greatly influenced factory techniques and solved the mysterious contamination of tea by lead. This phenomenon was of great seriousness as the UK authorities were disturbed by it, and actually at one stage gave the industry a time limit to clear up the matter. It was eventually traced to lead coating on drier trays and led to the introduction of stainless steel as a replacement. On the fundamental side of the biochemical work, Lamb clarified the conception of fermentation by identifying the enzyme at work and studying its distribution in the flush and manner of operation during manufacture.

King successfully introduced a larval parasite of Tortrix from Java, which changed the whole aspect of tortrix control. At one time tortrix egg masses had to be collected weekly, counted and destroyed, and appropriate reports made to the Plant Protection Officer, because it was a scheduled pest. This procedure was laborious, costly and not very successful.

Gadd, who eventually took over the Entomological Department in addition to his own, made exhaustive studies of the life cycle of Tortrix and its parasite, and also extended our knowledge of Shot-hole Borer. Gadd faced a series of difficult problems and his admirable tenacity was rewarded. The most elusive of all was the 'witches broom' problem, a wasting disease of tea.

Tubbs cleared up the deaths after pruning of low and mid-country tea and rationalized pruning techniques. He then started the major investigation of tea selection and vegetative propagation. Fortunately in his absence during World War II the work was kept going by Mrs T. E. T. Bond who was a graduate in Horticulture and worked part-time.

My own department was concerned with fertilizers, cultivation and soil erosion. At the time the Institute started, the use of artificial fertilizers was quite unsystematic, though there were two tendencies. Organic materials, such as blood meal and ground-nut cake, were held in some quarters to be more suitable than simple chemical compounds, and, as a variant of this view, fertilizer mixtures had often as many as five or six different components, all providing nitrogen.

After ensuring that the accuracy of field experiments on tea was comparable with that attainable at Rothamstead, the *fons et origo* of modern field experimental technique, I laid down long-term trials to test different quantities and varied qualities of fertilizers. For more than a decade these trials emphasized the importance of nitrogen the necessity of phosphate and the late advent of potash deficiency. These experiments did not come into their own in my time for two reasons : first because almost as soon as they were started crop restriction was internationally agreed upon, and secondly because during, and for some time after, the war, fertilizers were a scarce and regulated commodity. The experiments were, however, instrumental in convincing the advisors of the Secretary of State for the Colonies that fertilizers under a rationing scheme would be used to the best advantage, and in comparison with other crops and other countries the fertilizer allowances made available for Ceylon tea were liberal.

Fertilizer Rationing

As soon as war was declared in 1939 it was obvious that the importation of nitrogen, a prime component of explosives, would be rigidly controlled. Moreover, the waste products of other industries, some of which contained appreciable amounts of nitrogen, were needed in the countries of origin. Consequently the supply of groundnut cake and blood meal from India dried up. The Tea Research Institute called for a conference of the interested parties ; the fertilizer firms, the other research institutes, the Planters' Association, the Colombo Agents and the Department of Agriculture, which decided to set up a voluntary fertilizer rationing scheme to cover all plantation crops. The executive control of this scheme was delegated to the Tea Research Institute, acting on behalf of a representative committee presided over by the Controller of Imports. Dr R. V. Norris took personal control of the scheme and, with his gifts of personal persuasion and organizing ability, hammered out a scheme which was a resounding success and added greatly to the reputation of the Institute. It was a bold scheme. Each estate was given a quota based on acreage and the average yield of the previous three years. A standard mixture packed in standard quantites was compiled, in accordance with the field experimental evidence, and distributed through a network of district organizers. Every day a train of fertilizer wagons left Colombo, depositing scheduled quantities at stations beyond Kandy. These were subdivided, according to other detailed schedules, estate by estate. Estates near Colombo were supplied by road. The volume of work involved was colossal. All schedules had to be worked out in detail for a period of three months complete with time-tables, and account had to be taken of delays in arrival of ships and the variability of quantities delivered. I only remember two cases in which an estate sought to get supplies ' under the counter '. They paid exhorbitant prices for what they got ; the fertilizer was impounded at the railway station pending investigation, and their next official consignment was reduced by an equivalent amount. As an example of harmonious co-operation by all concerned it would be hard to quote a better illustration than the fertilizer rationing scheme.

Advisory Services

From the very beginning advisory work was carried out by the research staff. There are those who hotly contest the advisability of such an arrangement, arguing that the greater the demand for advisory visits, the less the time for research. The combination of the two activities keeps the practical problems constantly before the researcher, and nobody else's eyes and ears can completely deputize for the research worker's own. In the early days advisory work was confined to a relatively small body of enthusiastic superintendents. Later on visiting agents and agency houses began to consult the Institute on matters of policy.

There was always a certain amount of cut and thrust between Superintendent and Visiting Agent. On numerous occasions it transpired that a Superintendent's enquiry was prompted by a desire to acquire ammunition in an argument with the Visiting Agent. This, as may be realized, needed careful handling. I remember a case where in just such circumstances a visit had been requested and made. The Visiting Agent was also the Managing Agent, and he wrote to the Institute requesting that no queries from the estate should be answered unless they came through him. Shortly after receiving this demarche I received a letter from the estate in question. The Superintendent was informed of the Agent's instructions, and so the matter rested for about ten days. Then an identical letter with the same signature, but on the notepaper of another estate (of which he was temporarily *locum tenens*) arrived on my desk. I answered it with appreciation of the correspondent's ingenuity.

The close association of research worker and planter has, I am sure, been of value to both, and I bring to mind an amusing incident which led to a lasting collaboration. In the early days I wrote a number of articles dealing with fertilizers in the newly launched '*Tea Quarterly*'. One faithful reader, a stranger to me, decided to check up on my views by visiting the Rothamstead Experimental Station whilst on leave. I was also on leave, and was devoting part of it to a piece of research there. One morning I received a note from the Director, Sir John Russell, advising me about the Ceylon visitor, suggesting that I should take part in the discussion, and asking me to name a convenient time. So when the visitor, who had travelled seven thousand miles for a consultation, arrived, he was confronted by me, who in Ceylon lived forty miles away. We became firm friends, and many years later ended up as Director and Consultant respectively to the company concerned.

Controversial Issues

Many fruitful discussions of the work of the Institute took place at Planters' Association meetings, and, informally, at Club gatherings. In two instances the arguments blew up into major controversies. By chance, rather than desire, I became a protagonist in both.

Sir Albert Howard was well-known in India, first as an economic botanist who had bred and introduced varieties of wheat specially suitable for Indian conditions, and later as the Director of the Central Indian Cotton Growing Committee's research station at Indore. He became specially interested in the problem of raising the fertility of the ryot's small-holdings. Cattle manure was not available in quantity because it was, in the dry state, the principal fuel. Accordingly he advocated and systematized a method of composting designed to supplement the meagre supply of bulk manure. This was a very desirable and, in the circumstances, a most constructive objective. Sir Albert had a forceful and dogmatic personality, and on retirement from India he preached the virtues of compost with the zeal of a prophet. To him compost, which must include some cattle dung, was the *elixir vitae*, the cure-all. Fertilizers were poison, but compost would increase both the yield and quality

of crops, safeguard them from all diseases and pests and improve the nutritional status of food for both man and beast. He gained the ear of several company directors who issued instructions to Superintendents to make large quantities of compost as a matter of the highest priority, and to diminish or even cease to use artificial fertilizers.

The Institute became seriously involved when, faced with the virtual non-existence of ' waste material ' (*eg* straw) except weeds, estates began to lop their shade trees and convert the loppings into compost. This was wasteful in the extreme because green manures rot down readily when forked into the soil *in situ* and release their nitrogen in an available form, where it is wanted. To move green stuff from the field and compost it, losing quite a high percentage of nitrogen in the process, unless elaborate precautions were taken, and then move it back to the field was a waste of time, labour and money. The controversy extended over several years.

I tried to arrive at a satisfactory compromise and invited Sir Albert to lunch with me, an invitation he refused. In its place I endured a very stormy session at the Farmers' Club, London, during which he assured me that I was on the verge of dismissal and my career was in jeopardy. In fact, I had complete support from the Director and Board of the Institute, so I was not perturbed. The commotion subsided as rapidly as it began. In 1948 Sir Albert came out to Ceylon financed by the aforementioned companies. He gave lectures behind closed doors to which no member of the TRI staff was admitted, and he refused to answer questions. He made statements which planters knew from their own experience were incorrect, thereby prompting the thought amongst his audiences that some of the assertions, which they could not check, might be equally erroneous. Be that as it may, within a month of his departure my compost correspondence, previously running very high, diminished to insignificance. I always had it at the back of my mind that sticking to facts and keeping my temper was the best means of getting compost recognized in correct perspective.

The second controversy of some note arose out of the need to adjust wages to compensate for the rising cost of living for estate labour under war conditions. In 1941 the Government of Ceylon published as a Sessional Paper a " *Report of an Enquiry into the Family Budget of Indian Estate Labourers* ". On the basis of this report the Government proceeded to impose a " dearness allowance " as a supplement to the wages regulated by the Minimum Wages Ordinance. A Senior Officer of the Department of Labour ran into difficulties when in an explanation of the dearness allowance to the Planters' Association he admitted that some of the price data might be black market prices. A Committee was appointed to go into the question and I, having some specialized knowledge of statistical procedures, was co-opted and asked to examine critically the Sessional Paper and to report on the adequacy of the methods employed. I found a number of faults. The increase in cost of living and the monetary compensation arising therefrom are like the two sides of a balance sheet. They must agree. There are different scales for adult men, women and juveniles, and these are determined by the International Labour Office in Geneva, an offshoot in those days of the League of Nations. Their scales for the aforementioned categories were in the ratio of 5 : 4 : 4. The Labour Department proposes to use for payments the figures 5 : 5 : 4 and the Planters' Association had suggested 5 : 4 : 3. In brief, the Labour Department and the Planters' Association were using the right scale for determining cost of living increase but the wrong one for the payments.

The Planters' Association readily accepted the correction but the matter had to be fought from Department to Ministry and then on to a Sub-Committee of the War

Council, to which I gave evidence. The point of crisis occurred when the Government staged a test case in the Courts against an employer universally admitted to be giving benefits greater than the dearness allowance, partly in kind and partly in cash, but not in accordance with the law. I was put into Court to demonstrate the error in the calculations but I was never called because, under cross-examinations the Controller of Labour admitted the error. The defendant, Colonel T. Y. Wright, was found technically guilty and fined, but after that it was obvious that the dearnes, allowance would have to be altered. I was not allowed to see the report to the War Council at the time, but persued it some years later. Almost all the recommendations I had made in evidence were accepted, phrased as if their instigation had lain with the Department of Labour itself! It is not often possible to state definitely what benefit in monetary terms a piece of research confers on its sponsors, but in this case the necessary data were at hand. The correction of the index saved the plantation industries ten million rupees per annum.

The end of the war and the reunion of the Staff, without loss or injury, was a happy event. The supreme testing time for the Institute was unsuspected, although only just off-stage — the arrival of Blister Blight in 1946. The Institute was well equipped to tackle the problem. It has won the confidence of the Government and the tea industry, and was of good repute in the wider world of agricultural research. It was a happy place to work at, and I enjoyed my twenty-two years' association with it.

'O mihi praeteritos referat si Iupiter annos'

I cannot ever forget those golden years