

Tea Cultivation in South India *

By E. A. STONE,

Manager, Gajammudi Estate, Anamalais.

(Concluded).

Pests and Diseases. There are many diseases which attack tea and nearly all are fungal parasites. The fungal root diseases are the worst as they almost always kill the bushes they attack; so I shall describe some of these first.

Root diseases. The commonest root diseases in South India are probably *Ustulina zonata* and *Fomes lamaoensis*. The former fungus grows freely on dead Grevillea (silver oak) stumps and from them passes on to living tea bush roots along the lateral roots of the Grevillea so that often where a dead Grevillea tree has not been properly rooted out a patch of several dead tea bushes will be found round about it. In such a case the best way of stopping the disease spreading further is after carefully rooting out Grevillea stump and dead tea bushes and all their roots, to ring the infected area with a 2 foot deep trench, throwing the earth from the trench inside the ring. This is the most efficacious treatment for any root disease. When single dead bushes are found they and all their roots are carefully removed and burnt. Various chemical treatments have been tried, but have never proved to be of any real use. Years ago before it was discovered that lime was bad for tea, the soil around a diseased area was heavily limed in the mistaken belief that this would kill the fungus. Ferrous sulphate is sometimes used but has not been proved to do any good. The best way to keep root diseases under control is to have a system whereby bushes showing signs of disease are rooted out immediately. This cannot be done by putting on a few coolies to search up and down each field once a month, which is the haphazard method employed on many estates. There must be a system by which one or two men with digging tools accompany each gang of pluckers, and the pluckers and plucking maistries are trained to call them and point out dead or dying bushes. In this way, diseased bushes should not be missed and would be removed weekly so reducing the chances of fructifications forming on the dead wood and spores becoming distributed.

In the case of *Ustulina* the fungus does not spread through the soil but spreads from root to root when in contact. It shows up as black rings inside the bark in a transverse section of a diseased root, and in brownish patches when the bark is peeled off longitudinally. *Fomes* can be recognised easily from the way the mycelium causes a crust of earth to adhere to the

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outside of the diseased root. Inside the root the disease shows up as a honeycomb of brownish orange markings. Another fairly common root disease is *Rosellinia arcuata*. This shows up as a black spongy mass on the outside of the bark of the diseased root, but penetrates through the bark and forms large white star shapes, which are clearly visible between the bark and the wood.

Several other fungi have been shown to attack and kill the roots of tea such as *Diplodia*, *Portia*, other species of *Fomes* and *Rosellinia*, but these are uncommon. There is also a fungus which attacks the newly formed rootlets of germinating tea seed and causes them to drop off.

Stem Diseases. Various fungi attack the stems of tea bushes causing canker and 'die back' but do not usually kill the bush. Bad cankering occurs on the upper surfaces of the main branches, spreading up from the centre of the bush and finally continuing as holes running through the centres of the branches. If the canker gets very bad it is necessary to collar-prune the bush. Other types of canker show as splits in the bark caused by the fungus penetrating as far as the cambium layer of the stem and killing it in patches. 'Die-back' is the popular name given to the diseases which attack the branches of a bush from their green tips and cause them to die right back to the centre. Usually outer branches are attacked first. Occasionally every branch of a bush will become infected and the whole bush has to be removed. These diseases are usually ascribed to species of *Nectria*. There are various mild blights which do little or no harm, and such epiphytes as mosses, liver-worts, and lichens cover the lower stems, and are cleaned off at each pruning. A very weak solution of caustic soda is sometimes used for this cleaning, but usually the plants are removed with just a damp piece of cloth or sacking.

Leaf and stem diseases. An algal disease which has caused extensive damage in North India has been found in South India, but its ravages do not seem to be so severe in the hill districts. This is 'red rust' (*Cephaleuros parasiticus*) which can be recognised by a fur of little red hairs on the green stem and leaves. These are the sporangiophores of the alga which have pushed through the epidermis. The worst leaf and stem disease in S. India is probably 'Black rot' (*Corticium*). This fungus spreads over the stem and the leaves of bushes, causing the leaves to blacken and rot and finally after a period to fall off, the rotting leaves tend to stick together. Whole patches of tea become infected with this disease during the heavy rains and present a blackened rotting appearance, but when drier weather and bright sunshine return, the dead leaves fall off, and new buds appear, and soon the bushes can be brought back into plucking. On some estates gangs of labourers are put on to collect off all the dead leaves and blackened twigs and to collect the fallen diseased leaves and burn the lot. As the fungus is present on the bigger branches also this method cannot eradicate it. Nor is it possible to spray infected bushes with the usual fungus killing copper sulphate sprays (Bordeaux or Burgundy

mixtures) as the attacks occur during the heaviest rains. It is the writer's confirmed opinion that the best way to treat the disease is to leave it severely alone, making the pluckers also avoid touching the bushes when passing through the fields. The writer has adopted this policy for the last three years, and during this last South West Monsoon there was nothing like the amount of black rot on his estate that there was on surrounding estates which have spent Rs. 300 to 400 a year for the last four years on collecting and burning. Probably the best plan would be to mark the infected areas at the time of infection, and spray the bushes all over with Bordeaux mixture as soon as the weather makes this feasible.

Leaf Diseases. There are various blights which attack the leaves of tea in S. India, but these do very little damage to mature tea bushes as they only seem to attack a few leaves here and there. Grey Blight (*Pestalozzia Theae*) turns the attacked leaves grey, Brown blight (*Colletotricum Camelliae*) turns them dark brown, Copper blight (*Ginggardia Camelliae*) to a copper colour which later fades to grey, Sooty mould (*Meliola*) covers the leaves and twigs with a black powdery mould. This last named is dependent on the presence of insects, but seems to do no harm to the bushes. It looks ugly, and it seems to have spread in the Anamalai district a lot in recent years. While these blights do no harm in old tea their ravages in nurseries become serious if not checked by spraying.

Animal Pests. The most serious of these is undoubtedly eel worm (*Heterodera marioni*) in tea nurseries (see the first article on nurseries). This parasite is present in sour water-logged soil and will kill off eventually all the plants in a nursery if it once gets in unless the uninfected plants are quickly removed (i.e. in the case of a basket nursery) to another situation.

Termites eat away decayed wood on tea bushes, but one species will attack the living tissue also, eventually hollowing out the entire inner framework of the bush right down to the main tap root. This species is *Calotermes militaris*. Because of the ravages of termites in buildings most planters pay half an anna or even an anna for every nest brought in, and by this means hundreds of nests are destroyed annually per estate, and the pest has considerably decreased.

Another pest that does a certain amount of damage is the shot hole borer, which bores a neat round hole straight down the centre of the branches. Its presence is usually only discovered at the time of pruning, when the affected branches should be pruned further and further down until the parasite is found and killed.

There are other parasites such as other boring grubs, worms, bag worms etc. but these do little or no damage.

While there are many more pests and diseases of tea, the writer has included in this article only those which he has seen and identified himself, and considers these are sufficient to show that a good deal of care and money have to be spent on pest and disease control work.

I wish to close this final contribution by thanking the editorial board for requesting me to write a series of articles on the subject of Tea cultivation and for finding space in the *Madras Agricultural Journal* for my elementary efforts at giving some idea of tea cultivation to those who previously knew nothing of the subject.

The Annamalai University Colonisation Scheme.

By C. S. KRISHNASWAMI, L. Ag.,

Agricultural Demonstrator, Chidambaram.

Introduction. In India, agriculture absorbs and provides employment to millions of our people. With a view to find out whether scientific farming would provide a decent income to the educated unemployed, Rao Bahadur Sri. M. R. Ramaswami Sivan, Retired Principal, Agricultural College, Coimbatore, made a special study of the colonisation scheme in progress in the Punjab. He had the opportunity for this study, when he visited Lyallpur. In the Punjab, extensive areas with irrigation facilities are available and such lands were assigned to graduates who were willing to colonize them and make agriculture their profession. The initial assignment of land was on a temporary basis but with the proviso that if the lands were properly cultivated and the colonies were kept in sanitary condition, permanent occupancy rights might be granted to the lessees any time after a period of 5 years. The first batch consisting of 48 graduates from Arts, Science and professional colleges started the colony in 1932 and is still continuing as colonist farmers.

The Colonization Scheme. The impression created by the efficient working of the scheme in the Punjab made Rao Bahadur Ramaswamy Sivan enthusiastic to try a similar scheme for the benefit of the graduates and other educated men of this province. As a member of the Syndicate, he persuaded the Annamalai University to give a trial to a similar scheme utilizing the cultivable lands belonging to the University. The University permitted Mr. Sivan to start the scheme and allotted 100 acres of its lands rent free for this purpose. It also agreed to provide residence for the colonists and bear the cost of the permanent improvements to the lands. But it was not prepared to advance any sum to meet the cost of the live and deadstock, working expenses or the subsistence allowance to the colonists.

To find funds for the above purposes, a Co-operative society was formed and registered on 2nd May 1938 with the Vice-Chancellor and Registrar of the University as the ex-officio President, and Secretary respectively. Sympathisers of the scheme were also made eligible to become members of this Society and as many as 20 gentlemen have taken shares to the extent of Rs. 510, (at Rs 5 a share). Graduates of the Universities and other educated unemployed men who have at least completed their Secondary School Leaving Certificate and who are not below 18 years of