NOTES
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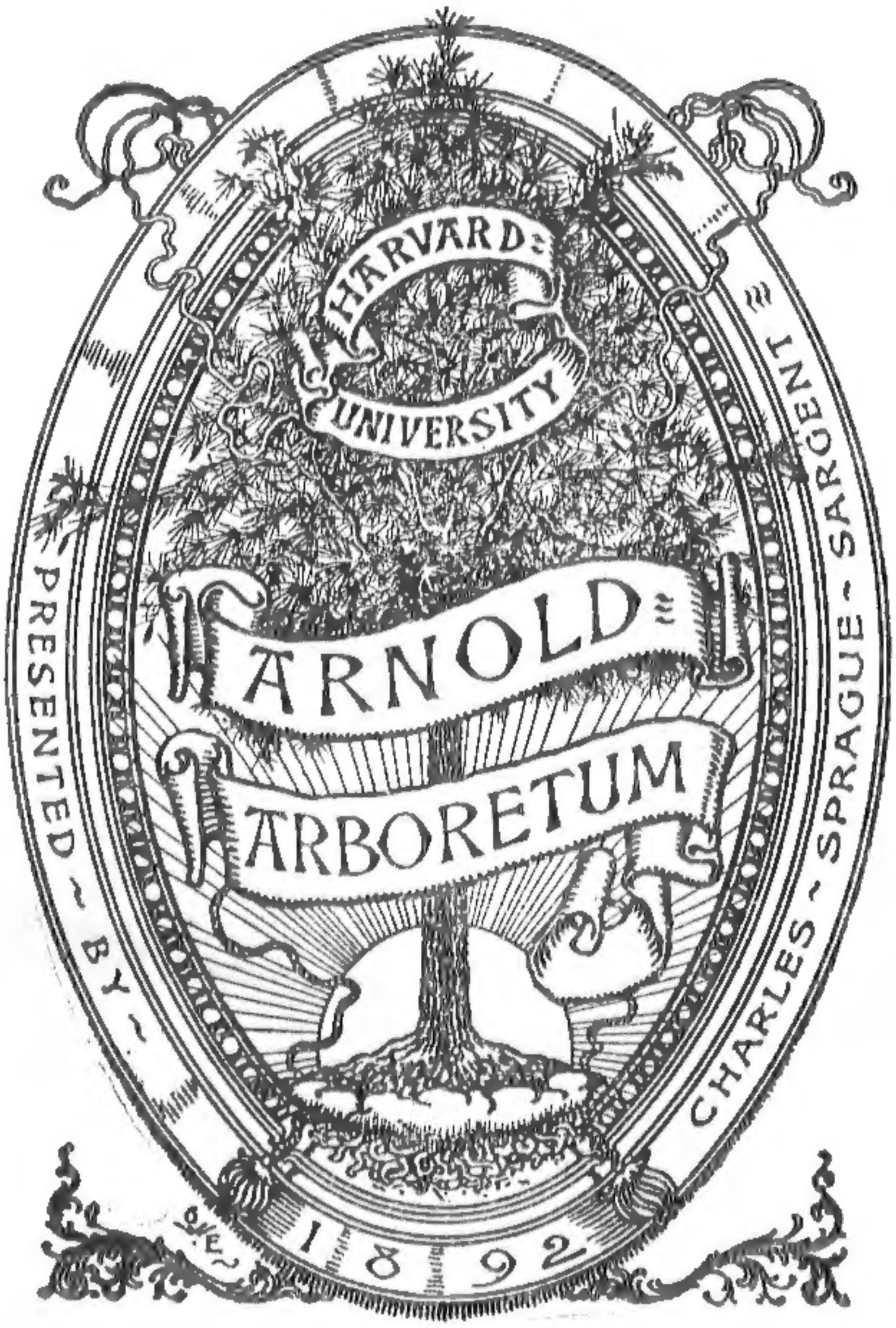
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NOTES

ON

TEA

IN

DARJEELING

BY

A PLANTER.

Darjeeling

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PREFACE.

THESE few Notes are published with the belief that they will be of some assistance to the young Tea Planter. The information has been gathered from observation and actual experience. And although much has been written about tea, many of the notions have not before appeared in print. That these notes may prove of some little help is the earnest wish of

A PLANTER.

INDEX.

CHAPTER I.

SOIL AND LAY OF LAND.

Nearly all the good land in the Darjeeling District has been either planted with Tea or cultivated by the Natives and the few pieces which are still available are generally covered with Bamboo jungle. Bamboo jungle is so expensive to clear, and the bamboos themselves are so valuable, that it is better to plant land that has been under cultivation, unless the supply of bamboos is unlimited, and plenty of money is to be allowed for the new garden or extension

Tea will grow in almost any soil, but a black loam with a fair amount of sand in it is to be preferred; if the subsoil is clay, it will not do so well, except when the drainage is exceptionally good, in which case gardens situated on dry

ridges often give a very fair first flush (which they would not do if the subsoil was sand), although if the rainfall afterwards is very heavy, they get clogged and blighted badly. Soil, which has many rocks in it, is always good, as the rocks keep it open, and some gardens, which are full of rocks, pay very well. Although tea rushes up quicker in flats, lying close to the bed of the river, a good slope is better. The flats want a great deal of drainage, and although they have. a splendid topsoil, the rocks are almost always very near the surface and very often directly the tea gets its roots well down, it begins to die off in patches, through the roots having got on to rocks. The flats are generally closed in, and shut off from the wind, the heat thus caused makes the tea grow very fast, but causes blight. Some gardens have put out all their good land and are now extending on land that is positively precipitous and really dangerous to cross. This will never pay, as the soil will soon be washed away when cultivation begins, (leaving the roots bare). I saw a piece of new

extension, the other day, which was too steep to terrace and grooves about 4 inches deep had been cut. Tea with a southern aspect never comes on well. Indian corn is the chief crop grown by the Natives. The roots only go down a few inches and do not do much damage to the soil. But where rice has been grown a very deep hoeing is wanted as the topsoil is sour. Land of this sort ought to be allowed to lie fallow for a year at least.

PLANTING TEA.

All jungle should be cut and burnt and land hoed if possible and all steep pieces terraced. There are two ways of terracing,—1st. By cutting your terraces directly the land is cleaned and making them the required breadth at once; Leave all roots and stumps in to hold up sides of terraces; And start from the highest point. Work, along as if a road was being made, following the curves of the land. When the first man has got about 2 yards along, start another coolie under

his terrace ; this man cuts down at the lower side, leaving required breadth and follows the run of upper terrace, and so on placing one man under the other. II. The other plan is to line out for terraces and then plant, only cutting a groove at first and every time the extension is hoed throwing the soil so much further back. This mode has many advantages. It is cheap. The plant gets the benefit of the good topsoil, and there is less risk of slips the first year. The lines of the terraces are not so good, and the plants are too near the outer edge. After the terraces are done, coolies should not be allowed, on any account, to touch the sides of the terraces with hoes, but jungle should be allowed to grow, and when it gets long, cut with a sickle. The great advantage of terracing is that it prevents wash to a great extent. But terraces are more expensive to keep up, as instead of one gang of people on hoeing, two gangs have to be kept at work one sickling and one hoeing. Directly the land is cleaned, it will have to be staked up. The terraces are very easy to stake, as the coolies measure from

one stake to another and drive in on upper side of levelled face. The non-terraced piece will have to be lined out with ropes. The best way is to strike a square with carpenter's square and run two ropes down and one across, and then measure from each stake, pieces of cloth in the rope are no good, as the rope will stretch. If the lines are straight up and down, it will be sufficient, but if the lines are to be planted straight, everyway, some few inches extra will sometimes have to be allowed for the dips in the land, and where the hill slopes two ways, except on flats or very gradual slopes, it is scarcely worth while making the lines straight each way, as the coolies never do good work when working across a hill. Terraces ought to be planted very closely, say 2 feet to 2 feet 6 inches apart. The bushes on terraces, particularly on steep land, run up very much trying to get above the edge of upper terrace, and it will be found difficult to get such level surfaces as can be done on a good lay of land. For this reason, plant closely, and a thick hedge of bushes along each terraces will be the result.

Many new extensions, in the hills, are being put out 4×4 and 5×5; this is too far apart. 3×3 is quite far enough, and even then it will be years before the bushes are touching. All bad soil, steep pieces and tops of ridges ought to be put out 2×2. This keeps the soil from washing down and gives a much better result. A private garden in this district was all planted out 2×2, and the result has been a great success. Very little of the land is good and some of it very steep, but the yeild is 5 mds. an acre now, and the proprietor said the other day, that he hoped to work it up to 8 mds. an acre, within the next 3 years. Very few gardens, in this district, give even 4 mds. and even the present yeild is a sure sign that the system is right. Plants up here take so very much longer to grow, and it takes so many years to get a garden (planted even 3×3) touching, that before long all extensions will be planted much more closely, and the ones now planted far apart be filled in again. It takes about 6 years for an extension, planted 4 by 4, to even pay expenses; whereas one planted closely

would do so in 4 years for certain. After the stakes are fixed, the coolies have to make holes for the seed, not on any account touching the stake, but making the hole close up. These holes ought to be cut about 15 to 18 inches deep and all stones taken out, and the holes filled in again with surface soil, and pressed down a little. Never leave the holes open too long, as the soil cakes. Have one gang of people making the holes, and another, following on the next day, filling them up; then the manager or man in-charge of work can see every evening and morning that the holes are cut to the proper depth and all rocks taken out. There is a great rush just at present for high Jat Assam and Hybred Seed for planting up here. This rush will not last, and it is a mistake. The Assam Seedling does not stand the cold well. Has to be treated very tenderly and even when it grows into a fine big bush, does not give anything like the yeild one would expect. The bushes, when you look into them, have really very little real yeilding wood, and all the shoots come from a few stems and the teas although stronger than China, are

nothing like what the real Assam grown leaf would give. Sometimes, if an exceptionally cold month is experienced in the rains, the bushes stop flushing altogether until warm weather returns. Besides this, the seed is very expensive, and after its long journey from Assam, rarely arrives here in good condition and lots of vacancies are the result. The China plant, although it does not look so well, yields much better, and comes on in any soil. It takes longer to grow than the Assam does, but gives a much better yield, often 5 or 6 maunds an acre. Whereas, I do not think there is a garden up here with much Assam Plant that gives more than 4 maunds per acre. The China leaf makes pretty and flavoury teas, and the gardens, which get the best prices up here, are (with one exception) all China gardens. Any one opening up a garden in this climate, should plant all his land with China. If he has any very low lying flats Assam will do fairly, but even then Hybrid is best. If a fixed area is to be planted, a professional survey should be made. Extensions are generally measured by the stakes and a

12 ft. Bamboo, but mistakes occur and very often the acreage is very short. Messrs. Kinney & Sons of Calcutta survey cheaply. and their maps are most useful, as no measurement will be required afterwards, either in hoeing or jungle cutting, as it can be told at a glance, what coolies will be required to clean a particular piece. Plant two seeds, to a tully, that is, if the seed is good. If bad, plant 4 or 5 and where ever the plants come up too thickly, draw all but two, and use the plants to fill in the other vacancies. 8 or 10 seeds are sometimes planted in each tully, and all, except 4 left at the corners of a square drawn at 6 months. If the seed is very plentiful this insures the extension being full of plants and other of the seedlings can be drawn afterwards, although if left in these 4 seedlings make a very good plant. Seed, if it comes from any distance, should be planted directly it arrives, as it will deteriorate rapidly. Even with seed plucked on ones own garden, it is advisable to plant as soon as possible, and the sooner seed is planted the better it will germinate. If the

seed has to be kept in bulk, never pile it up, lay it out in layers and turn over every other day. If you lay it in heaps it ferments and rots. Do not put it in the sun, but keep it in some cool place and damp it occasionally. Sow the seed 1 inch deep in damp soil, 2 inches deep where the sun strikes very strongly. Do not plant the seed too deep, as it will spoil the seedling. 2 inches is deep enough for anything. After planting, put some jungle over each tully, to keep the damp in the soil. Another advantage of this is that any soil, which is washed down hill, falls on to the top of the jungle, and when this is taken off, the earth is thrown off at same time. Take the jungle off in May, directly the seedlings begin to show above the surface, and loosen the soil of the tullies with a small fork, as in some cases it will have got caked and hard and prevent the seedlings showing up. If possible do nothing but hand weeding for the first year, but if the jungle gets at all, long sickle it and hand weed the tullies. If long jungle is allowed to remain, (even for a few days) it draws the seedling up, and if there is

any hot sun, directly after the jungle is cut, the plants wither down and in many cases die. Germinated Seed gives so much trouble that it is not a good thing to use. The coolies, unless most carefully watched, break off the tender root and in some cases, even plant the root upwards. It is impossible to watch more than a very few people, and great loss will occur through the seed getting damaged, In the 1st week of August, if possible, fill in all vacancies with 6 months seedlings. Very large seed-beds ought always to be made, so that the 1st year 6 months seedlings can be used, and 2nd year 18 months seedlings, thus keeping the young tea as level as possible. If in the cold weather, it is found that many of the seedlings are weedy straggling plants, prune them back to about 6 inches. Many extensions are put out with 6 months plants and in some cases with 18 months plants, in the latter case, unless the plants are pruned down low, the first cold weather they will take another year to recover the shock before they begin to grow again. There can be no doubt that the cheapest way to

extend is to plant 18 months seedlings, as it saves 1½ years expense of cultivation, but there is more risk of vacancies and most gardens want all their labour during the rains and cannot spare enough coolies to plant any large area. In the 2nd year, the work will be easier, that is, if the tea has been well filled in, more sickling can be done and a hoeing in May and another in October will be found very beneficial. It is a good plan to leave a little jungle on the land during the cold weather, as it helps to shade the plant. Of course only in the lines between tullies. All tullies should be kept clean. Many pieces of new tea are hoed in November or December after the jungle has stopped growing, do not do this, as the soil gets very dry and as the little plants' root is only a very short way down and it suffers accordingly. Whereas, if you hoe in September or October, some jungle springs up again. If your plants are China, keep them down very low 18 inches to 2 feet is quite sufficient for a full grown plant. But if they are Assam, prune back second year to 16 inches, 3rd

year 20 inches, leaving as much wood as possible at the sides of bushes. Pluck very lightly for the first 4 years. It is better not to pluck 3 year old tea until June, by when the bushes have put on a lot of wood. Do not touch the sides, and pluck all the bushes with a measure. In many cases the plants are allowed to run up for 3 years and cut back heavily in the 4th year. This plan does very well Another good idea is to prune heavily in the cold weather, and cut back to 5 inches of growth in the beginning of July. The yield from the plant is less, but it gets into grand order and will make up for the loss of leaf the next year. Never try to plant out tea too cheaply it does not pay. An extension will probably cost 40 Rupees per acre 1st year, 30 Rupees 2nd year and 15 to 20 Rupees for 3rd and 4th year, per acre. Tea scarcely ever pays in Darjeeling, until it is at least 5 years old. Many agents and proprietors give a commission per acre on all extensions, if there are not 10 per cent vacancies. This is a good plan, as it ensures extra care; the only objection to it is that the old tea may be neglected for the new,

but this is not likely as most probably the manager is drawing commission on his profits.

CHAPTER II.

SEED-BEDS

should be made on level or nearly level pieces of ground and a plentiful supply of water should be handy. All bamboo roots should be cleared out, and the ground hoed very deeply, the deeper the better. Hoe at least two feet deep and clear out all rocks, stones and pieces of root. The beds should not be more than 3 feet or 3 feet 6 inches broad, as if they are, the children will not be able to weed the beds properly, without treading on them. Make the drains, between the beds, about 18 inches broad. All beds ought to run with the slope of the hill. When the seed-beds are very large ones, make bamboo nullas to bring the water across the bed, and cut deep holes at intervals, so that the water can be run into them, and always be handy for the coolies watering. After the bed has been hoed twice, send another gang of coolies over the land, breaking up all clods with clubs

and levelling the soil down. The seed ought to be planted at least 4 × 4 inches, or even farther than this apart. But the great difficulty in the hills is to get a ny fairly level land, and 6 × 6 takes up so much room, that it is very hard to find land to plant any large amount of seed. If the seed is planted too closely, the plant comes up a miserably weak, whippy, seedling, and is very often scarcely worth putting out. Whereas, if the seedlings are a fair distance apart, they get good strong healthy stems, and are always a success. On many gardens, seed is planted broadcast, and the worst seedlings weeded out, but this is a bad plan. Always choose good soil for your seed-beds, but it is not necessary to manure it. Earth from the roots of Bamboo clumps may be added, or if the soil is too heavy, a little sand mixed with it. In a seed-bed, made on a flat, where cattle had been standing, not a seedling lived, as everyone was eaten off by Koomlas (cockchafer grub). In many cases the beds are shaded during the cold weather with sun-grass or mats This saves labour in watering, but all shade should be taken off by April, and

if there are any overhanging boughs from trees, they ought to be lopped. For, although the seedlings will look healthy and run up under the shade, still, if they get any hot sun after being transplanted, they will die at once. Many planters prefer very bad soil for their seed-beds, saying that when the plants are removed into better soil, they get a grand start, but although the theory is good, as a matter of fact, a weedy sickly seedling nearly always turns out a sickly plant. The seed should be planted 1 inch to 1½ inches deep, and on no account, deeper. Seedlings never come on so well in beds, that have been planted before, unless fresh soil is carried. If there is very little land available for seed-beds, you may plant twice, carrying some soil the second time, but after this stake up bed and leave plants to stakes, thus making a small extension, and this small extension can be utilized as a seed garden and grown accordingly. By this, I mean letting them run high and not picking leaf, but only seed. Seed is ready for plucking, when it turns brown and begins to crack. Only pluck bushes, that are very

healthy. All seed-beds should be made in October or November, and planted in December. Any gaps or large vacant spaces in old cultivation may be utilized as seed-beds. In this case plant your seed 6 inches by 6 inches.

TRANSPLANTING.

This is most trying work and simply endless. On old Cultivation, where the lines are anyhow and vacancies 25 to 30 per cent, double stake all your seedlings and do not fill in too much at once, but go over each piece several times, until you are sure each seedling will live. 18 months seedlings are best. Start transplanting in June and keep on all the rains. Dig holes for the plants, place two plants in the hole, and gradually fill in the soil until the plant has a good grip. Never drill in anything except 6 months seedlings. Hoe the filled in piece regularly, and do not let any heavy jungle get on to it, as if it does the coolies will cut many of the transplants. Old seedlings are not to be despised, if they have good stems. Cut them down to the ground in the cold weather after they

have been planted and they will come on well and soon form bushes. If you leave them high, they take years before they start growing again. If roots of seedlings are very long, cut taproot with a knive, the same if they are slightly broken. Always carry the plants with as much as possible of the soil attached to their roots. If you water the beds well before transplanting, the soil will hold better. If seedlings are very long, cut back a few days after they have been transplanted particularly if they appear to have felt the sun. Cutting transplants right below the ground, and earthing up over the cut is a good plan.

CHAPTER III.

CULTIVATION.

One deep hoeing and two or three light hoeings are all that are required by a hill garden. The garden ought to be hoed deeply in November, and as big clods as possible turned up and left unbroken thus letting as much light and air into the

soil as possible. No more hoeing should be done until May, as no jungle will show in this district until then. Many gardens are hoed 5 or 6 times in the cold weather, this does no good and is a positive waste of money. Many other Planters hoe deeply, during the cold weather, and go over the land in March, breaking up all clods, the real reason in many cases, why this is done, is that the agents have ordered the manager to hoe the garden a fixed amount of times, and this is an easy way out of it. The best thing to do is to wait until the 1st Flush is off, and then run over the garden lightly hoeing and tullying the bushes up well. Hoe again lightly in June and not again (except on very flat pieces) until September or October when a light hoeing gives a fillip to the last flushes. Many managers now fork entirely. Forking is no doubt better than hoeing, as the soil is not pulled down so much, but it takes more labour, and is naturally more expensive. A coolie should start at the top of a hill and work steadily down, placing all the soil above him and drive his fork in all round each bush, and gently

stir the soil, not dragging it out, as if he does so he will break the laterals. If the steeper portions of the garden are hoed or forked once a year, it is quite sufficient. As if much hoeing is done, in the rains the topsoil is soon washed away, all the laterals exposed and the bush stands up from the soil with nothing but its tap root to feed upon pieces of tea of this sort, can be seen on any of the older hill gardens, and of course the yeild from these pieces is miserable and scarcely worth plucking. The best thing to do is to sickle all the steep pieces, and earth up all the bushes, as much as possible, and whenever you have spare labour carry soil and place it round roots. If the cross lines of the trees are fairly straight, terrace wherever it is possible, and build up walls in all the very steep portions to prevent wash. On many gardens which have been badly cultivated, the soil two inches under the surface is as hard as bricks, and the coolies will be only able to do very little work. But if you can afford to spend the money on deep cultivation, do so and the return in yeild of leaf will much more than repay

the expense. If the deep hoeing is done in October and November, it will be done much more cheaply, as the ground has not got hard. But if this is found impossible, it is a good plan, to make the women with children do most of the hoeing, as they will dawdle a great deal if put to pruning, and only delay the other coolies. Whereas, if they are put to the hoe, they have a fixed amount of work to do, which they must do or get fined. Hoe forks do well for hard soil as the prongs get into the soil better than the blade of the hoe will, the only objection being that the prongs will often break off if they hit upon stones beneath the surface. In hoeing in the rains the blades of all the grass jungle should be covered up, as if portions of the grass are left above the surface it will begin to grow again at once. In handweeding pull all the jungle up by the roots, (do not break it off) and lay the jungle down between the lines of bushes. In sickling cut all jungle right down to the ground and hand weed round the bushes. The only way to eradicate sun grass is deep hoeing,

followed by hand weeding. Ferns give a lot of trouble, as the coolies break the leaves off, leaving the roots in the bushes, and although they may place a pile of ferns at the end of each days work, for you to see, still they leave two-thirds of the roots in the bushes. It is just, as well, where ferns show very thickly to give some boys small forks to take out a fixed number of ferns every day, these are counted up in the evening and looked at to see that the root has been properly extracted. There are several sorts of creeping jungle which climb all over the bushes these ought all to be pulled out by the roots. Bamboo soil or soil from marshy places makes very good manure and gives good results But cow-dung is not good, it always seems to bring blight. Sometimes after having it put down at great expense the only result has been swarms of small red beetles and white grubs. The beetles eat off all the shoots and the grubs kill all the seedlings that had been filled in. Horse-dung is very little good and if a place is once manured it has to be kept up A piece of tea under some stables, used to

flush splendidly, but directly the stables were removed left off yielding and only gave a very poor return. There is very little doubt that the better a garden is cultivated the better it will yield, but on steep hills it is best to get a steady medium quantity of leaf than it is, to hoe and get a rush of leaf for a year or two and afterwards scarcely any return at all and so one should do nothing but sickle the steep portions of the garden, after the rains have begun. In draining your flats cut cross drains as well as long ones about 3 feet deep and where embankments and raised drains are made kill off all crabs that are to be seen as they bore through the walls and sometimes flood the flats. If it is only water from Jhoras or Springs you want to drain, embanked drains are much the best, as deep drains will drain the little moisture, there is in the soil in April off, and every drop is then wanted, so do not cut unnecessasary drains. If you have to hoe round your plants and cannot handweed, only hoe very lightly and be very careful of the laterals, if the weeds are just scraped off that is all that is

wanted. The great advantage in forks is that the coolie is bound to handweed the plants and cannot tear his fork through the roots without exerting himself. The disadvantage of earthing up round a bush is that the bush at once throws out laterals, which are exposed if the soil is taken away again. On many old gardens where the tea is planted across the hill instead of down, the upper sides of the bushes are earthed right up and have thrown out laterals close to the surface. The lower side of the bush is generally a hollow, consequently the upper side of bush flushes well, lower badly, but if you try to draw the soil down the laterals are cut at once. This is a question to be decided whether it is better to leave the bushes as they are or level the earth.

Plants per acre.

2 ft.	× 2 ft.	= 10,890.
3 ft.	× 3 ft.	= 4,840.
4 ft.	× 4 ft.	= 2,722.
5 ft.	× 5 ft.	= 1,742.

CHAPTER IV.

PRUNING.

This is really the most important operation of the whole year and one about which there is great difference of opinion. Nearly all Darjeeling gardens are pruned from 20th November to beginning of March. No doubt, it would be better if the pruning could be begun in January and finished about end of March, but very few gardens can afford to put off their pruning so late, as they have not a sufficient supply of labour to risk it, and the gardens have all sorts of work which has to be done before the plucking commences. A manager ought always to know beforehand whether quality or quantity will be required and in exactly what state every portion of his charge is, what yield he got from, and what growth there is on the different portions. Where blight (if his charge is subject to it) appears, and which pieces are most attacked, and by what blight or blights. What portions of the garden flushes first and best. The

yield he gets from the different portions in each separate flush and causes of it. What was the result of different kinds of pruning on the several pieces. The labour he will have. And what money he can afford to spend on the pruning.

When the pruning is to be started the Manager should prune a dozen bushes himself both good and bad, and not pick out a good bush or two and leave the coolies to prune the bad ones without any sample. After he has pruned as he wishes the work to be done he should teach the Chuprassis and Duffadars who will be in charge of the work and make them each prune for a day or several days until he is satisfied with their work. Then a small muster of coolies should be started at work and gradually increased until the whole muster is on. This work requires a great deal of supervision and the coolies should never be left until the manager is positive that every individual coolie knows what he has to do.

Light pruning is done in several ways Many gardens are only just shaved with a knife and each coolie prunes 500 to 600 bushes, the result of this

sort of work is a very heavy first flush, medium second flush and scarcely any tea made after the beginning of July.

The best light pruning is expensive but with China bushes gives a very good return. About 3 inches of new, healthy wood must be left, all knots cleared out and all twigs and rotten wood cut away, a fair amount of leaves should be left all over the bush but not enough to prevent the free passage of the wind. Where trees suffer badly from red spider take off the leaves in the lower parts of the bush, and leave a fringe at the top chiefly on the new wood. Many planters do not allow the sides of the bushes to be more than tipped, or in some cases leave the sides altogether. What does quite as well, if not better, is to prune the sides back to decently strong wood and then make the coolies leave them alone, not even plucking open leaf for the first 2 flushes. This results in strong wood at the sides of the bushes which yields as well as the centre does. All branches trailing on the ground must to be cut off as they give no leaf and only take a large

amount of the sap which would otherwise go to make leaf at the top of the bush. On no account leave too much of the new wood, 3 or 4 inches is plenty. Do not trouble to level all your bushes, at any rate, do not cut away strong young wood (leaving only $\frac{1}{2}$ inch wood) for the sake of a flat surface. Cut the good wood 3 or 4 inches above the former years pruning make the coolies cut each twig separately and not slash at them anyhow. Do not allow the coolies to carry away the old wood that is cut out of the bushes, as if you do, many of them will cut off good branches for fire-wood.

Cup shaped pruning is done on many gardens. This is cutting heavily in the centre of bush and lightly at sides. The idea being that the bushes always grow strongest in the centre and will rush up quickly to a level.

Stick pruning may pay on gardens much subject to red spider, or with a clay subsoil. It is cutting to straight wood stripping the bushes of leaves and leaving the bare stems. One rarely sees a really satisfactory piece of work of this sort.

Cutting heavily is pruning back to about 2 feet cutting off all knots and only leaving the healthy stems. After cutting heavily the bushes have to be left unplucked until June or July.

Cutting down is a very extreme measure and is only resorted to when the old bushes have twisted gnarled hard old wood all through them, which of course, gives a most unsatisfactory yield. In some cases the bushes have to be cut right down to the ground, when this is done the plot of tea must be well hoed and all bushes earthed up even if soil has to be carried for that purpose. Occasionally the bushes can be left 18 inches high. But with very old China plants the lower they are cut the better as they are nearly always one mass of knots twisted wood and lichens right down to the ground. If any lichen is left on after pruning send some children round with brushes (old horse-brushes) or anything rough to scrape it off. In heavy pruning all bushes should be cut from the centre, and the coolies ought to work round as they prune, so that each portion of the bush is cut out towards them from the

centre. The year after heavy pruning or cutting down all the work must be done with a measure and about 6 inches of new wood left, cutting the middle of bush first and then working round levelling the bush. Another system which pays very well is to leave about 10 inches of wood the year after heavy cutting, pluck very hard and the bush will give an enormous yield. Then in the 2nd year cut back again leaving about 6 inches of the straight wood and only tip long shoots in 1st and 2nd flushes. On a dry garden the best time to cut down is in May. Prune very lightly or not at all in the cold weather, pluck the 1st flush sharp, very hard and down to the eye, and then prune down. The result is a big yield of good tea from 1st flush and if May is a fairly wet month the bushes are fit to pick again by end of June. As hill gardens make very little tea in May, little or no loss in outturn is made and the bushes are wonderfully improved, as having plenty of rain the shoots are very strong. A piece of tea that always suffers badly from Green Fly in second flush, will make a large increase on outturn if

you begin cutting on lowest portion of affected piece, thus driving fly up hill. If there is a piece of tea blighted with green fly under the portion you cut, the fly will work up and attack the new shoots directly they show. Trees on the tops of dry ridges will come on very much better if cut in May than they will do if cut in cold weather July is also a good month to cut back in on dry gardens, but no plucking will be done again until the end of September and the manager must be very careful that the piece cut is not subject to mosquito blight. Any pieces of tea cut in May or July must be kept very clean, either hoed or sickled, as if the jungle once gets up to the top of the bush the young shoots will be weak and in many cases shrivel up when the sun gets to them. On many gardens there are pieces of tea that were cut down years ago and then pruned in the old style. I mean leaving 12—15 inches growth, these pieces if cut back in May into the straight wood leaving about 6 inches above former heavy pruning will come on splendidly. China bushes will bear more thinning out than Assam will and

Assam bushes which have been heavily thinned out take a long time to recover, at least they do in the hills. On many gardens one sees fine great Assam bushes and is surprised to find they only yield 2 to 3 maunds an acre. The bushes are probably 4 or 5 feet high and on looking into them you find they are a mass of knots, crow's feet, and twigs, with 3 or 4 healthy shoots on the whole bush. But from a short way off they are quite show bushes. Cut all these kind of bushes back to 18 inches and let them gradually recover their size, they will not look so big for a year or two, but bushes are not grown to look at, but to pay, and an Assam tree will yield better and stronger leaf at 3 feet than it will do at 5 or 6 feet high, and the coolies will be able to pluck them much more easily. China bushes only 18 inches off the ground yield lots more leaf than bushes 3 feet 6 inches high do. And any bush whether China or Assam that has good straight wood will yield more than a bush double its size and all crow's feet. A good many managers now prune their gardens with very big

pruning knives and give heavy ticcas but clumsy work must be done and although the gardens may do well for a short time before long they will begin to suffer for it. Some men prune heavily year after year. Some lightly year after year. But the best way is to give your bushes a rest once in a way. If you believe in heavy pruning, once in 3 or 4 years prune lightly and give the bushes a chance, or if you have been pruning lightly for years, cut heavily once in 5 years and get some good wood instead of all the knots that are forming. The chief objection to Heavy Pruning is that it weakens the teas but this is only because you have to let the shoots run very long before you pick them. The bushes will flush much better the 2nd year and tea be very nearly or quite as strong as ever, and bushes easier to prune, and easier to pick. The best way to prune is lightly on yielding pieces of tea and heavily on badly yielding pieces. When pruning lightly and only cutting out very bad pieces, cut these bad stems nearly down to the roots so that the coolies cannot finger the new growth (without putting their hands right inside

the bush) until the shoot is well up and nearly level with the rest of bush. When the garden is an ordinary hill garden, chiefly China plant and is pruned fairly lightly, it will cost from Rs. 6-8 annas to Rs. 7 an acre. If cut down or heavy pruned, much less, about Rs. 4 an acre. The pruning the year after cutting down will cost about Rs. 4 an acre. Sometimes portions of gardens are not pruned at all and let run until July, in some cases where the plots aredamp, the result will be very satisfactory. Pieces burnt down to the ground come up splendidly from the roots, this is well-worth trying on ridges, and very bad pieces. Another system is to cut right down to ground and earth up over the cut. The shoots force their way through the soil and look like new bushes. Always start pruning on the shady side of a garden and if you begin pruning early, on the highest part. The sap going down sooner in the colder places. If pruning is begun on the sunny side an early Banghy flush is sure to be the result.

It is a curious circumstance, that several of

the gardens which have been cut rather heavily year after year are those which suffer most severe ly from green fly. Whereas some of the gardens which are pruned very lightly have no green fly at all. This shows that it does not do to prune heavily too many years in succession.

Never prune all your garden in the same way, as if you do the rush of leaf will come on all over the place at the same time, whereas if two-thirds of the garden is pruned lightly and one-third heavily, two-thirds of the place will flush tremendously at the beg[illegible]g of season, and the flush from one-third will be heaviest in July and August, and the garden will be able to be worked with much fewer coolies. If too much of the garden is pruned heavily, all the teas will be weakened, but if a small portion is treated this way every year, the other tea will bring up the strength, and a steady increase will be made every year instead of an uncertain crop. If the garden has to be worked with a very small force of coolies, very light pruning will do best, as when the rush comes in April no other work is

on hand, and so many coolies will not be required for picking during the rains; so that more coolies are available for cultivation and transplanting.

CHAPTER V.

PLUCKING.

Of course every thing depends on what sort of pruning has been done. And what sort of Tea is wanted and whether Fine Teas, Medium Teas, or a large quantity of coarse tea is to be made.

In any case directly the bushes begin to shoot have a gang of coolies on taking out all the open leaf which shows. Put on a good many coolies, as if once the leaf is allowed to get ahead, it will be almost impossible to catch it up again and even then a good deal of the open leaf will be hard and make very poor stuff. Whereas this first open leaf if taken sharp enough makes very fair tea.

If you have pruned very lightly and intend cutting down in May, or mean to make one-third of the tea from 1st Flush, in the old

style, pluck the shoots hard and only leave one eye. This system is radically bad as the garden very soon gets nothing but wire, and although the surface of the plants may be large the total yield is miserable.

The best system is to keep most of the coolies on at the open leaf, and have a few of the old coolies going round as sharp as possible and plucking the shoots when long and where 2 leaves can be left. Two leaves and bud ought to be picked, but sides of bushes on no account touched until they get to level of rest of the bush.

In the 2nd Flush again have the best people going round taking off longer shoots and leaving an extra two leaves. A larger gang will be required as the leaf will run better, if the bushes have been well cleaned out.

In the 3rd Flush leave one leaf again making 5 in all (if the growth is stunted) if it has run up well 4 leaves will be sufficient. Let the leaf run well on all parts of the garden where the two first flushes were bad and where more growth is required. After this pluck as hard as possible

taking off the leaf as soon as two leaves and a bud show. The advantage in leaving so much growth is that the pruning will be much more level and following years crop good

The result of this style of picking will be. 1st Flush, rather small quantity and only moderate teas 2nd Flush —Good quantity and very fair quality 3rd Flush.—Very large quantity and good quality, and afterwards for the rest of the year very fine teas, as good leaf makes good tea. Thin out bushes as much as you can and on no account leave too much growth from any particular flush, as the longer the growth you leave, so much longer will it take to harden up and if the weather is cold, the next flush may be delayed for weeks. What is left on as open leaf only goes to choke up the bushes, and every lb. of tea, that can be made will help to pay expenses. Do not leave a lot of leaf on the bushes because it is slightly hard, it may bring down the average, but surely it is clear profit if made into tea, as the coolies will have to be kept and work found for them. This applies particularly

to the 1st flush, when sometimes hundreds of maunds of leaf are left on the bushes, and the coolies are only doing unnecessary work. The reason that the leaf was left on being the average (sale price) which the Manager was afraid of bringing down. Many planters will say that leaving 4 or 5 eyes, is a waste and the extra growth ought all to be in the tea boxes. But they will find that nothing is really lost in the long run by a little extra wood. After Heavy Pruning or cutting down, the bushes should be allowed to run up until the new shoots are nearly a foot long, when some careful coolies should be sent round to tip the long shoots with a measure. If they are China bushes that have been cut down to the ground, 1 foot will be sufficient measuring from ground. If Hybrid, pruned back to 18 inches, pluck 27 inches from ground; or if unevenly pruned, with a 9 inch measure from centre of bush. Do not touch the sides until they have run slightly longer. By this system one gets strong healthy wood to prune on. If a piece of tea has suffered badly from Red Spider or green fly, leave the

flush after the blight has left longer, and do not pluck hard at once; as if the tree is not treated too severely and given time to recover, it will make up for the former loss of leaf during remaining months of the year. When the garden is attacked by green fly very pretty teas ought to be made, and "a fair flavour can be got. Pluck the little hard shoots as soon as possible and do not be put out because the coolies only bring in 4 or 5 lbs. leaf. The tea ought to make up in price for the loss in quantity, if there is a loss." In the Hills, Assam and Hybrid bushes have to be treated much more tenderly than China plant. With Assam plant do not trouble to thin out, and let the bushes have a very easy time of it at the beginning of the year.

Many planters advocate picking half the 3rd or Pekoe Souchong leaf, and say the flush comes on sharper if this is done. It may be so in the plains, but it is not the case up here, as it has been tried repeatedly; in one case this year on alternate lines of bushes, and the trees from which the extra half leaf was taken did

not come on so quickly as the others. Very often in the 3rd Flush and after, it is found possible to pick a 3rd and even 4th leaf. In this case have a leaf sieve erected, and sieve all your leaf (after rolling) to get out any particularly coarse leaf. In Darjeeling there is always a long wait after the 1st Flush, and very little tea is made for about 3 weeks. But after that the coolies ought to go over the garden picking long shoots, once in every 8 days. Very often when there is a very heavy flush, pice are paid to coolies for extra leaf. This must never be done in the first two flushes, and only in exceptional cases in the 3rd flush. The coolies pull the leaf off anyhow, unless watched for the whole day, duffadars pick for their wives, and neglect their work, any amount of damage is done to the garden, and a lot of coarse tea made for a certainty. The only time when it is actually necessary to give pice is when a garden is very short of labour, and the Manager finds a flush has got away from him. And in that case he ought to be continually through the coolies, and look

at every basket before weighing up, and fine heavily for bad leaf. Even then the result will not be satisfactory. In hot steamy weather the leaf in baskets should be continually turned over, or it will heat, ferment, and go sour—this is particularly the case in hot steamy flats. Always look through leaf that is being picked, at least once a day. One will very soon get to know who are the bad coolies, and who are likely to pick badly; and by walking across the work behind the coolies can at once see if the bushes have been torn to pieces, or left unpicked, or open leaf scamped over, and left on the bushes. Have all your leaf baskets made with wide bottoms; as thus made, there is less probability of the leaf fermenting in the baskets; and never let the coolies ram the leaf down into their baskets unless it is absolutely necessary—for instance, if they having picked so much leaf that it will not go into the baskets without forcing. Always clear a Banghy flush right off, whether it occurs after hail or from any other cause. Sometimes the first two flushes are plucked very hard, and

third allowed to run for new wood. But the wood thus made is very thin, and this system is not a good one. It is a common thing to hear that such and such a garden has lost some hundred maunds of tea through hail. In most cases this loss is much over-estimated, as if the bark of the bush is not damaged the 2nd and 3rd flushes will be very strong, and nearly if not quite make up for loss. Even if the 2nd flush comes on Banghy, it is so thick that a tremendous lot of tea is made, and if well thinned out, the 3rd flush will rush up splendidly.

Occasionally in very dry seasons, the first flush, through want of moisture in the soil, is a failure and scarcely runs at all. When this happens many planters tear off every leaf that shows, make a large amount of tea in April, and trust to 2nd and 3rd flushes for the new wood. This system, to say the least, is risky, as if the bushes are blighted in 2nd or 3rd flushes, scarcely any tea is made and at the end of the season, the wood being very weak, a good deal of the gar-

den will have to be cut heavily. This may be worth trying where the flush is entirely Banghy, but every shoot that shows ought to be left to run. If the little leaf that grows in November can be called a flush, there are seven flushes in the year, in the Darjeeling district. Although a few gardens at high elevations may lose one flush, through want of sun, either in August or September. Up to the beginning of September a coolie ought to pick 20 lbs. leaf a day, if the flushes are not blighted badly, but after then the plucking ticcas will have to be reduced as the leaf will get much lighter.

CHAPTER VI.

BLIGHTS, AND TEA PESTS.

EVERY year the amount of different insects which attack tea, seems to be increasing. Some 12 years ago, the Darjeeling district scarcely suffered from blight at all, and now many gardens are most seriously affected. The three

worst blights are :—

Red Spider.
Green Fly.
Mosquito.

These three blights seem to attack the tea in turns. Red Spider comes on in the hot dry days of May, but dies off directly heavy rain falls, and is succeeded by Green Fly which flourishes in very rainy and cold misty weather. Mosquito then comes and lasts until end of the season and it is no unusual thing to hear of a garden suffering from all three blights in turn. when (of course) the crop is very small. The cause of these blights has been argued out many times, but no satisfactory conclusion has been come to. Years ago, Red Spider was shown as a curiosity at a meeting of planters in Darjeeling and there was quite an argument as to whether it attacked young seedlings or not. Nowadays, it attacks every sort of tea and is common on seed-beds. Some gardens look perfectly red from the distance, and suffer very severely for about 6 weeks, others are only attacked on small patch-

es of tea. Red Spider, generally, seems to start near bamboo clumps and in hollows, but rapidly runs over the rest of the garden. Wherever, there is a good draught of wind, it soon disappears, but stops much longer on shaded places. Green Fly is getting worse every year. It was scarcely known 7 years ago, but is rapidly spreading, and will probably be much worse in a year or two. It does not generally get seriously bad until the rains are well in, and if the garden is kept clean, is soon killed off by a few bright hot days. A curious thing about green fly is the way it disappears when it gets to the top of ridges and sometimes even at a road. This Fly generally first attacks pieces of tea close to sun-grass or light jungle. It never works down hill, but always up. The Mosquito is much the worst blight and has already ruined several estates in the Terai, and at the foot of the hills. It is now rapidly spreading in Darjeeling, and all the lower lying gardens are suffering more or less. It generally starts in marshy flats or near heavy jungle. This blight is much the most to be

dreaded and will probably be the only blight talked about in a few years. It is not bad in Darjeeling until about September, but plenty of trees may be seen slightly attacked even in May, and as it multiplies every year, it is sure to come on sooner year by year. Of course, one reason of those blights is the gradual thinning of the jungle and their natural food, but may not heavy pruning and heavy plucking have something to do with it by weakening the trees? If a garden suffers very badly from Mosquito, it might be a good idea to revert to the old style of pruning, and only just shave the bushes, as the trees when treated this way, flush most at the beginning of the season, and a larger proportion of crop would be made before the Mosquito appeared. Aphides, or plant lice, are not included in the list of blights which follows, as they really do no damage to the shoots and in no way retard the flush.

CHAPTER VII.

RED SPIDER.

Red spider is the first blight to show. It occasionally attacks the first flush, but does not get bad until May. It is a very minute spider, but quite perceptible to the eye, and if a leaf is picked, and the finger run down, a bright red stain will be seen. This blight is not really half so bad as supposed, as if the bushes are in fair order it only retards the flush slightly. And it is only the sickly bushes that suffer so very badly. The remedy for red spider is good cultivation and careful work, and it can soon be (to a great extent) got rid of. Hot scorching weather brings on the spider, and rain prevents its increase, or at any rate retards it. All the remedies, Lime, Sulphur, &c., are more or less useless—let alone the expense. Tea has sometimes been burnt to the ground and then cut heavily, and in the 2nd year the red spider has showed up again. The stronger the bushes are the less damage the spider will do, so

get the garden into good order, and the spider will not do much harm. Forking seems to have a better effect than hoeing on plots of land subject to spider. Where there is a free passage for the wind the blight is not so bad. Titea Part has been tried as a remedy, it was cut and laid between the bushes, but the result was not satisfactory.

Green Fly.

This is much more serious, but still scarcely so bad all round as it might be, but it is spreading every year. It used not to come until well on in the second flush, but last year it was in the bushes nearly all the cold weather, and came out in swarms during the pruning. Cold, rainy, sunless weather suits the green fly, especially during the months of June and July; and it spreads over acres a day. The effect on the bushes is, that the shoots stop growing, leaves shrivel up, and only grow to 2 inches long, showing little eyes at every inch the length of shoot being perhaps 2 inches, and having 6 or 7 eyes breaking on each shoot. Pick it as quickly as possible taking leaves as small as can be picked. The coolies will only pick 3 or

4 lbs, but that cannot be helped. In some casesthe leaf gets so hard that the coolies get sore fingers from picking it. But the leaf makes very pretty tea and fetches very good prices. It is a known fact that green fly always goes uphill, and never down. Hoe and clean all pieces affected, and all pieces just above. Do not allow any shade in the shape of jungle: green fly cannot stand hot sun, and if a piece of tea is kept thoroughly clean, will soon disappear, or any how work up hill and when it gets to the top of the ridge disappear. And if the tea has been properly treated a splendid flush will come out directly it leaves, which will nearly make up for the loss, unless the blight is really exceptionally bad. Pieces have been left unpicked; but the flush takes longer to come through, and the result is not so good, besides loss of good tea. Bushes are very often regularly shrivelled up, the leaves half black, one month, and looking as healthy as possible the month after. And sometimes, a cut-down plant, without a shoot 3 inches long, one month, directly the blight leaves will come on splendidly.

This is of course after good cultivation. If you do not hoe the pieces above the blighted piece, the green fly when it moves up will stay there.

Mosquito.

This is very much the worst blight. The leaves are regularly dried up, and the shoot is attacked directly it shows, and tea made on the bushes. In fact, in many cases gardens are perfectly shut up (as far as leaf plucking goes) for months. There is no doubt that the Mosquito is spreading in the hills. It invariably first attacks the low-lying hot flats near the bed of the river, and then works up. This year the blight has spread more than ever, and many gardens never before attaked have suffered badly. It is a curious circumstance that sometimes a piece of tea is black with blight on one side of the road, and the other side not touched. All sorts of remedies have been proposed: lighted torches carried through affected parts at night, children catching mosquito &c., but nothing will stop this plague when it once starts. There is a smelling bug which has identically the same effect, but the bug is

fortunately rare. Up to the present Darjeeling gardens have not been badly attacked until the middle of September.

Beetles.

There is only one beetle generally known which attacks tea. This is a small reddish yellow insect, which always turns up if cow-dung has been put down, and sometimes on new extensions, probably from the same cause. This beetle seems to attack heavy pruning or young tea more than other pieces. It bites the shoot low down, and the shoot withers or rots away. If there is Sun-grass near the tea, the beetle goes to the grass, instead of the tea. When these little pests appear, put some children to pick them off, and give 1 anna a 100 if the beetles are plentiful. The worst of this is the coolies soon find out that they crowd on sun-grass, and will go off the tea to catch them, if not well watched.

Soot Blight.

This is a black blight. Partly brought on by damp. It is a small insect with a sooty cover-

ing, which makes the trees look fearful, and stops all flushing. Luckily, this is not common, and as a rule only one or two trees will be found on a garden. On one garden a whole flat was black, but this was a marshy enclosed flat, and the whole tea was originally in a very bad state. Remedy,—cut down, or pluck leaves and wash stem.

Mildew Blight.

This is also rare, and shows up as small white spots on stem of tree. The leaves fall off. And in many cases the tree will die. Cause,—probably damp. Remedy,—Cut below spots.

Caterpillars

very seldom attack tea when there is other jungle for them to eat. There are only two kinds: a black prickly caterpilar 1 inch long, the larva of a small slow flying yellow and black butterfly. They do very little damage. The other kind is much worse, and sometimes clears every leaf off patches of 30—40 acres. This is the larva of a small white moth. It is a black caterpillar about

½ inch long.

CADDIS,

another insect which takes all the leaves of a tea plant to make a coccoon. It generally does this in the cold weather. Children can easily pick these off the bushes, which can be seen at once as they are generally denuded of leaves.

COCKCHAFER GRUB—KOOMLAS.

A white grub with yellow head. Generally found in very rich soil, or where manure has been put down, or much jungle has been buried. This is fearfully destructive to young cultivation and seed-beds, and eats off the roots of the young seedlings before they harden up, in some cases killing off nearly every plant in young cultivation Only remedy digging up. Plants attacked by Koomlas generally die slowly, first getting yellow at the top and gradually dying down. Never fill in a vacancy thus caused without digging the insect up.

BORERS.

Two sorts. One a scaly worm, not common.

Bores a hole through the center of stem. Sometimes starts near root, sometlmes high up. The other is a small white grub which generally bores into new wood. Remedy,—cut down below where boring begins and destroy worm.

Crickets

do a great deal of damage to young tea, eating the plant off, near the collar. There is no remedy if many are about; if only a few, they may be caught by children.

Grasshoppers

eat the leaves of the bushes and damage young tea. Cause,—clearing away all the jungle, their natural food, and forcing them to eat the tea. Remedy,—leave a little jungle on roads and sides of terraces.

Rats

sometimes attack the roots of plants and kill them off. But these are not common in the hills. They are generally fonnd where coolie lines have been demolished for extensions. Remedy,—poison.

CHAPTER VIII.

MANUFACTURE.

On all large estates, it is better to have an European assistant to look after the factory work, as the natives, if not well supervised, will very likely under-wither or only half ferment the leaf if they can get their work done earlier in the evening. And 1 anna a lb. on the teas will make a tremendous difference to the profits. It is impossible to lay down any fixed rules for manufacturing as the climate and elevation makes so much difference to the teas. And as different sorts of teas are wanted in various years, it is very hard to tell what kinds will be in demand. Several private gardens have done well by finding out whether most gardens were ordered to make quality or quantity and working on the contrary system. Some gardens always make their best teas at the beginning of the year, but fall back afterwards, this is through plucking too hard at the beginning of the year and having to leave the leaf on longer to make growth in 2nd and 3rd flushes. Another question is, whether it is better

to sell teas in Calcutta or London. Of course, the Brokers have to make a profit, but the margin is so small and the market fluctuates so that in many cases when Calcutta valuations have been refused the owners of the gardens have made a heavy loss by sending teas home. It is probably best to sell any very fine teas in London and medium or coarse grades in Calcutta. Young gardens invariably make good teas and in many cases the owners have thought that the use of Machinery has lowered the quality of their teas, when the true reason has been that the garden was not so vigorous. Nowadays strong teas are generally demanded, but some estates which make mild, flavoury and pretty teas get splendid prices, whereas many gardens which make exceptionally strong teas only get miserable prices. If any mark gets known as making a flavoury tea the demand soon rises and good prices are the result it is simply useless for Darjeeling to try to compete with Assam for strength, and a flavoury tea will often be drunk without mixing with China teas. The following mixtures and remarks

are taken from (The art of tea blending).

Low-priced Tea.

$\frac{3}{8}$ Paklum.
$\frac{3}{8}$ Darjeeling (Broken Tea or Souchong.)
$\frac{1}{4}$ Kintuck.
Darjeeling to point up flavour.

Medium.

$\frac{1}{2}$ Kintuck.
$\frac{1}{8}$ Oonfa.
$\frac{1}{4}$ Darjeeling.
$\frac{1}{8}$ Indian Broken.
Darjeeling must possess character.

Fine.

$\frac{3}{8}$ Kintuck.
$\frac{1}{4}$ Ning Chow,
$\frac{1}{16}$ Foochoo Pekoe.
$\frac{3}{16}$ Assam Pekoe. (Assam Pekoe must be pungent.)
$\frac{1}{8}$ Darjeeling Broken Pekoe. (Darjeeling Broken must be thick.)

Darjeeling teas are full and flavoury, but are

not so pungent as Assams. The infused leaf is tender and bright. The dry leaf is blacker, but taking the average, is scarcely as tightly twisted as that of Assam teas. Occasionally Darjeelings are found that do not possess the flavour for which the district is justly famous. The tea is then soft, and insipid and is useless for increasing the flavour of a blend.

This shows plainly that flavoury teas are wanted by the grocers.

PROCESS OF MANUFACTURE.

When the leaf is brought in by the coolies in the evening it should at once be laid out in the trays and on the floor to be withered. Assam and China leaf should be kept separate, as if mixed the fermentation will be very uneven. The leaf should be put out in very thin layers in some dry place. Build a few *chulas* below to slightly heat, and a chimney at the top of the withering shed to take off the excessive moisture. Well withered

leaf can be told at once by the soft clinging feeling it has when taken in the hand. It is much better to over-wither than under-wither, as a really pretty tippy tea can be made from over-withered leaf, and a fairly dark infusion got, although the liquor will be rather dull. In fact many planters slightly over-wither on purpose when they want tippy teas. And it is certainly worth while, when one has a large quantity of strong and flavoury but not good-looking teas, to over-wither a few maunds to make the tip to mix with them. The only excuse for under-withered leaf is in the rains, when the Factory is crammed with leaf. When very often the manager is bound to roll off the leaf under-withered or else sacrifice a great deal of tea, on some of the cold rainy days that occur in July and August, it is simply impossible to wither leaf properly, but in this case the leaf can be generally kept over for one or two days. A rather important matter escapes the notice of most men. When firing up on the chulas in the morning the heat of the factory often rushes up to

140—150 and then after a short time down again. This ought not to be allowed, and all windows should be opened before firing, and heat kept steadily at say 100—105; this is now done in several factories. The effect of very great heat is that half the leaf above is scorched not withered. On most estates more withering sheds are required. A cutcha house with mat walls, which can be pulled up or down is the thing, as much light and air as possible is obtained, and the air cannot get steamy to the same extent as it does in the pucca factories. One often sees leaf put on the iron roof of the factory, this is a bad plan, the leaf is only scorched and the tea is never good, and very red. Of course most leaf withered in the sun is red more or less, but not to the same extent, and probably the leaf put on the roof is not really withered at all, but only dried up by the great heat of the iron. Directly the leaf is withered, roll. If pretty teas are wanted, roll lightly for say 20 minutes in the machine. But if strong teas are wanted, roll heavily for 40 minutes and put in a larger amount of leaf. In many cases

the leaf is rolled twice. Rolled once, taken out, allowed to cool, and rolled again. The best idea is to roll first flushes heavily even to smashing leaf up in roll, and get strong teas. And after the fine plucking has begun, begin rolling gently and for a much shorter time. In some cases too much leaf is thrown down from the withering loft and is left lying in heaps on the ground as it will not go into the rolling machines. This must not be allowed as the leaf overwithers, ferments and gives a disagreable taste to the teas. When the leaf is rolled, run it through leaf sieve. If fermented to bright salmon, fire off at once; if not, place in some cool place until the desired color is attained. Fermentation is a subject we know very little about; but we can be sure that either putting in very hot or very cold places to ferment is a mistake, as the ferment is only artificially forced on or delayed. If you over-ferment, your teas will be dull, weak and soft. In fermenting the best way is to spread the leaf evenly 2 inches thick, and cover up with a blanket or thick black cloth. It is not a good thing to ferment in balls or

cones as the leaf will often get quite black on the outside of the balls before it starts colouring inside them. Fire off your teas directly they are ready and do not leave it lying about. If there is too much leaf ready at the same time, half fire the tea. Fire the leaf very thinly and do not give a tea-maker too many trays to dry, as it may result in some tea getting fired or burnt. If the leaf is put too thickly on the trays soft teas will be the result. The sharper you fire the brisker the teas will be. Of course in every garn of leaf there are some big coarse leaves and also leaves from inside of bush —generally light yellowy-green in appearance. These leaves will not either wither or ferment properly, and only make red tea, but when cleaning the teas these can be thrown out Sift at once. Most men sift through 10 and 8 mesh for Pekoe and Pekoe Souchong. 9 is small enough for the Pekoe and this mesh is used with advantage on several gardens. If three kinds of tea were made, it would be quite sufficient, *viz.*— Broken Pekoe, Pekoe, and Broken Pekoe Sou-

chong. The Broken Pekoe Souchong containing the broken tea and Souchong, is cut up, until it will all go through 8 mesh. In some cases, the Broken Pekoe and Pekoe are mixed, but it is doubtful if this pays. All teas should be bulked by the manager in factory before sending away. An easy system is to pile in one big heap, cut a trench round, throwing all the teas up round a circle until nothing remains of original heap. Then work the tea back by making each man walk round, throwing the tea from the circular wall into a heap again and as far over the top of mound as possible. The tea is then slightly refired and is weighed out to each man; he starts pressing it into the chest, throwing in a few pounds at a time, and pressing steadily round, shaking the box slightly to get the tea into the corners. When the box is nearly full, he puts a cloth on the top, and gradually tramples it in with his feet until he has got the whole amount in. Then another coolie solders up box, and carpenters close. The boxes are marked with garden mark, grade,

weight, and number, and despatched.

One often sees a garden getting splendid prices regularly, but on enquiry finds that a very smal crop is being made, and perhaps, in spite of the high average a serious loss on the years working.

In some cases, when a large proportion of red tea and dust has been made, it is thrown away to manure the bushes or given to the coolies. This is an extremely stupid idea, as if the tea only fetches 3 annas a lb., it will give a very good profit and although the agents or proprietors may be angry at the quantity made still the profits will be larger and consequently manager's commission bigger.

CHAPTER IX.

MACHINERY.

Any garden that can make 200 maunds tea will find machinery necessary; as although hand-rolled leaf may look very well aud the prices be

good, still the expeuse is so great and there is so much difficulty in getting men on an estate, that it is better to get machinery as soon as possible. The sooner, the machines are bought the sooner they will pay for their cost. On small places only making 500 or 600 maunds tea, Thomson's Challenge Rolling Machine is all that is wanted. This machine gives very good result, it can be worked by hand and rolls extremely well, but only takes a small fill. In buying an estate, or land to plant tea, one of the most important things to look to is the available water power. The great advantage in having water power is the saving effected in fuel. If there is plenty of wood on the estate, it will cost from Rs. 9 to Rs. 10 a 100 maunds, according to distance from factory, if cut in the Government Forest, the Government Royalty is Rs. 6 a 100 maunds, and the cutting and carriage will bring it up to Rs. 14—15 a 100 maunds, so that for a large estate requiring 5,000 or 6,000 maunds, the expense will be very great. Where the water supply is small, a Turbine is best as it takes much less water to drive, but the pipes

are expensive and have burst on several estates in this district. Wrought Iron pipes are more expensive than cast iron, but there is not the same risk of them bursting, and the carriage will be less. Gilbert Gilkes Vortex Turbine does not require much water, is very compact and noiseless, and works extremely well. Water-wheels are very easy to work and never get out of order, but take more water, the Iron wheels are really the cheapest and do not cost much to carry, being made up in small pieces which are easy to fit together. Marshall's engines are most used, and are the best. Where economy in space is necessary, a Vertical engine should be indented for, but in other cases, nothing can be better than Horizontal Engines and Locomotive type of boiler. As to rolling machines, many planters believe in the Excelsior. This machine takes a very large fill and rolls fairly well, but rather flattens the twist of the leaf. The old original Jackson gives as good results as anything and rolls off both soft and hard leaf splendidly. The new machine with springs above the table is supposed to be a slight

improvement on the old machine and is coming into use in this district.

The double-action Jackson is not well spoken of, and Kinmond's rollers seem to be going out of use. Nelson's roller of the mangle type with bags is still used with great success on several estates.

Kinmond's dryers give very good results, but the Sirocco's require no driving power. Several gardens have improved their averages 1 or 2 annas a lb. since they have used drying machines, and they save a great deal in labour and although the first cost is large, this is soon paid for by the smaller consumption of fuel. Jackson's Victoria dryer has been well spoken of in Assam, but has not been much used in this district although it is now ordered for a large estate.

Sieves all seem to give good results if well looked after and there is very little choice, the only secret being the right size of wire for the different qualities. If one of Jackson's old sieves is used, a leaf sieve can be attached to it, This

extra sieve takes very little extra power and does very good work. Reid's cutter is a really good machine for cutting young teas, all the other machines are breakers and create a lot of dust and smash the tea, whereas Reid's cuts clean with little dust and is used by several of the gardens which get the best prices in the district. The clean cutting enabling them to get a large proportion of the original Pekoe Souchong and Souchong into the Pekoe, whereas if it was smashed it would only go into the Broken Tea. As to fuel it would be a good idea to work out the average amount of wood used per maund, and give the engine-man a bonus of Rs. 4 or 5 for every 100 maunds, he saves. All wood or coal should be kept under cover as the wood gets heavy and does not burn well, and the coal deteriorates very much if left in the open. In case of a careless engine driver allowing the water to get too low in the boiler, it is always better to smother the fires with earth than to draw it. If engines and machinery are varnished over the paint, it will save a lot of trouble in cleaning and preserve the

paint longer. Although very few gardens or companies can afford to have an engineer on the estate, there are several engineers in the district who will look after and keep the machinery in order for small pay. This is a great advantage as amateurs invariably come to grief if they try to look after their own machinery. Some few Planters by long experience have got to know how to repair any ordinary breakages and on some gardens native mechanics who have been in the railway shops are employed, but the majority of men know very little about engineering work, so it is much better to employ a competent engineer, as a break down in the busy season means a very serious loss.

CHAPTER X.

COOLIES.

It is most important to know exactly with what coolies your garden can be worked and not have too many in the cold weather and too few in

the rains. Every winter a great many coolies come in to work for a few months, but go away again in March. These people are very handy for opening out new land and doing any extra hoeing that may be wanted, but unless there is extra work to be done, they ought not to be allowed on the garden. The usual effect is that all cold weather work is done by the beginning of March and there is no work for the old coolies, if the muster is lowered very likely, some of these leave and go to other gardens. It is very difficult to tell what coolies will be on the garden for the rains and many gardens have more coolies than they can possibly do with for some 4 months and not enough to get their leaf off afterwards. If old coolies can be kept on a garden it makes things easier for every body as they get to know the manager's system of work and can be depended upon (to a great extent) for any very careful work that is wanted. The coolies are too well paid in Darjeeling, and if they were paid a lower rate, they would turn out to work better. As Indian corn is sold at 80 lbs. for the rupee, if one child turns out

to work every day, he can earn enough to feed a family of 4 or 5 people. Of course, if they want extra clothes or jewelry, it is different, but many of the coolies are covered with jewelry either gold or silver and are altogether too well off. There may be a few gardens where the labour supply is scarce, through being close to Darjeeling or the manager being disliked, or in unhealthy situations where it is necessary to pay highly, but if a few gardens would combine the rates could be reduced all round. Some few gardens are always short of labour for some reason and coolies bolt in the most unaccountable way. Where kyehs live on the estate the coolies are invariably in debt and when their debts get very heavy always run away to Nepál. It is a mistake to allow the kyehs on the estate at all, as it is a great temptation to the coolies to buy unnecessary clothes &c., if they have not to pay ready money, These shop-keepers charge most exorbitant rates of interest, generally 1 anna in the rupee per month, or 75 per cent, and work the interest up in an extraordinary way, so that

very often a coolie finds that after paying Rs. 50 on an original debt of Rs. 10, he still owes 20 rupees or more, and as the Nepálèse are always afraid of going to Court, the Kyah does as he likes. Another reason of Sirdars losing their coolies is gambling; a Nepálese Sirdar thinks nothing of losing or winning Rs. 300 in a night when he is only getting Rs. 25 a month, and if he looses, he has to appropriate the coolies pay to settle his debts with. It is little or no good making the Sirdars sign agreements to give a fixed number of coolies, as unless the cold weather muster is allowed to be very high, they always have the excuse that they were not allowed to put on the coolies when they could get them. It is easy to make a garden liked by coolies. Particularly if there is plenty of native cultivation on the estate or waste land they can make use of. Always pay and advance on a fixed day, never varying, and never try to make them do extra work on their holidays. It is no good if you do, as they hear other garden's gongs go and do nothing or else purposely

do bad work. Make them always do a fair amount of work, that is, look at the ground they are to hoe and if it is in jungle or the ground very hard, reduce the ticca, if easy work, increase. Do not try to make them do an extravagant amount, as if you do, the coolies will prefer to work until 5 o'clock and do less work. Whereas, if by working until 3-30 they can finish their task, they will work their hardest to do it and get away. It is very easy to find out what ticcas neighbouring gardens are doing, and in the whole district there is really very little difference in the amount of work done. Of course, allowance must be made for quality, and weather. A 10 feet or 12 feet measure is used or the work is done by lines. For measuring work have battens cut 12 feet 6 inches and stamped at both ends with garden mark. Promote from your own coolies as the Duffadars will work much better if they think they may get increased pay by doing so. Make each Duffadar responsible for the work of a fixed number of coolies and the Chuprassis responsible for the whole work.

One will, in this way, soon find out which men are worth anything and which are useless. Duffadars are not as a rule appointed by the manager but by the Sirdars, who employ them to keep their coolies in order, and in return for bringing coolies to them. The result of this is that nine-tenths of the duffadars are useless for work. One very seldom hears of strikes; in a few cases the coolies have some serious grievance, but sometimes it is got up by one or two lazy brutes who get the other coolies to follow their lead. If you can find out the leaders of these strikes turn them out neck and crop, and never mind what coolies they take with them. When a coolie really does bad work, fine heavily and punish severely, but never on chance, coolies will often go off in a batch for a fancied grievance, but never if they know, that it is their own fault that they have been punished.

There are innumerable jats of Nepálese:—

1. Bowan, Thugre.—High caste, chiefly beggars, no good on gardens.

2. Chetres.—Men very seldom work, keep large herds of cattle.

3. Gurung, Mungar, Bhotia Mourme.—Nearly equal in caste. All good coolies and work on most gardens.

4. Newar, Jarme, Hiu, Cumbu, Measur, Lurungs, Limbo, Sunwar.—The Newars are generally shop-keepers or traders. Cumbu or Jemdars are very fair coolies; a few gardens work almost entirely with these people. Lurungs are good workers, but very clannish and quarrelsome, and often leave a place in a gang for a fancied grievance. Limboos intermarry with Lepchas in many cases, very clumsy pickers, but hoe well. Sunwars, jewellers; fair coolies; there are plenty at Kurseong.

5. Carmie, Dhirzee, Sarkie, Girtie.—All low castes. Carmies jewellers or blacksmiths, Dhirzee dress-makers. Sarkie, boot-makers, workers in leather. Gerties or Guellames, the slave caste of Nepál, not any of these coolies can eat or drink with the higher castes. Bhutias very seldom work on gardens, but sometimes carry boxes

or loads.

Lepchas are good people for clearing land, but do not work well in the rains. This race is dying out fast through disease and intermarriage. Very few are to be found on gardens, and in Sikkim, there are only a few on the lower ridges.

Although most gardens have a Doctor, who visits when called for, the coolies will, in most cases, have to be doctored by the Planter. For coolies only a few simple remedies are generally employed and in most cases, if they are not cured by the 1st and 2nd dose, they will not come again, and the following list will be found quite sufficient. A thing to be remembered is that the stronger a remedy is the more a coolie will believe in it.

MEDICINE.	USED FOR.
Carbolic Acid.	Disinfectant, Ulcers, Scabies, with oil for burns.
Chlorodyne.	Dysentery, Diarrhœa.
Castor Oil.	Purging.

(Continued.)

MEDICINE.	USED FOR.
Cholera Mixture.	Cholera, Dysentery.
Camphor.	Cholera, Diarrhœa, keeps away fleas, Toothache.
Antidysenteric Pills.	Dysentery.
Tincture of Kino.	Diarrhœa and Pyrosis.
Epsom Salts.	Purging.
Jalap.	Dropsy and Purging.
Alum.	Astringent, good for leech bites, Emetic.
Friars Balsam.	Cuts.
Aconite.	Rheumatism, Neuralgia & Toothache.
Arnica.	Bruises and Sprains.
Phenyle.	Disinfectant, Slight sores.
Podophyllin.	Sluggish Liver.
Spirits of Nitre.	Dropsy & Kidney diseases.
Quinine.	Fever and Tonic, Neuralgia.
Santonine.	Worms.
Zinc Ointment.	Ulcers, Foul sores.
Sulphur Ointment.	Itch.
Simple Ointment.	Mild sores, Dressing.
Paregoric.	Colds.
Ipecacuanha.	Emetic, Coughs, Dysentery, stings of insects.
Ammonia.	Headache, Bronchitis, Hornet or snake stings.
Borax.	Sore Throats, skin diseases
Cardamoms.	To prevent Griping.
Bicarbonate of Soda.	Dropsy, Stings of Mosquitoes' and Wasps'.
Glycerine.	Dressing for wounds, slight sores.

CONTRACTS.

All contracts should be given out either to Sirdars on the garden or contractors known to your Sirdars, or to men for whom a Sirdar will be responsible. Give good advances and pay up as soon after the contracts are executed as you can, as a man will charge heavier rates if he has to get advances from money-lenders and the garden will have to pay the interest as he will put it on in some way; in some cases contracts are not paid until the year after they are finished. The only consequence of this is that the manager has to pay higher rates and has more trouble than any one round him. And the only advantage, that he can keep over the account until the following year and make the profit look better than it really is.

CHAPTER XI.

BUILDING.

The building that a planter has to do is in

most cases of a very simple kind. In building coolie lines one has very little check on the workmen, and many managers let all the coolies sit on full pay for 3 or 4 days and build their own lines; others give a fixed amount to each Sirdar to build and thatch all his houses. Most gardens are now building pucca lines, and unless the bamboo and sun grass is very near and plentiful, this is much the best plan. Pucca lines should be built in the cold weather, say the beginning of November when work is slack, you can utilize all the coolies to cut sites and carry stones for the foundations. The nominal cost of this is large, but actual cost very small, as the coolies would have to be kept employed and probably they would only be put on to some useless work. If cutcha bricks are to be used make them large, $12 \times 6 \times 4$ is a fair size. If the houses are to be built pucca make the bricks smaller, the English measurement $9 \times 4\frac{1}{2} \times 2\frac{1}{2}$ inches is the best size, if they are larger the loss in the kilns through half-dried bricks will be much worse; as it is it is as well to allow for 10 per cent. loss in any

kiln. A 100 feet long by 16 feet wide cutcha brick coolie line will cost about Rs. 550, including masonry, timbers, and carpenters work, but exclusive of iron. If thatched the pitch of the roof ought to be about 40°, if less it will leak, and rot very quickly. Do not employ the plains masons, they want 9 annas a day, pay, and do very little work and always require a coolie to wait on them. Any ordinary garden coolie will soon learn to do any of the simple work required in building the usual lines and the work will not cost one-third the amount. The chief thing to be careful about is that they do not use too much mortar between the layers of bricks or stones to fill up the small gaps. The ordinary rates for bricks are :—

Pucca	Rs.	4	8 annas	per	1,000.
Cutcha	,,	2	8 ,,	,,	1,000.

Masons building rates are :—

		Rs.	As.	
Building	per 100 cubic feet	2	8	Brick work.
Do.	Do.	3	0	Stone work.
Plastering & white-washing	do.	1	14	

Carpenters Rates :—

Roofing iron	per 100 sqr. feet	1	8	
Cleaning and fitting Posts &c.		0	2	per foot.

To mix lime use two-thirds sand, one-third lime and one-third its bulk of water. In making the mortar allow for a loss of one-third in bulk. Do not use iron nails or lime when putting on Zinc roofs as they corrode the Zinc. And allow for 2 corrugations, and 6 inches at each end of sheet.

If you intend to shingle the roofs use Cartouche or Bangey shingles, they last for 4 or 5 years, whereas Utese rots in about 2. The shingles should measure about 16×4 inches, and 1,000 will cover 100 square feet, allowing for broken and damaged shingles; coat the shingle with a mixture of 1 Tar 1½ Pitch, or wash it with a solution made of lime, salt and sand, this latter mixture acts as a preservative and makes the roof very nearly fire-proof. At low elevations a thatched roof is much preferable as it will not get as hot as an iron roof. When shingles get old they can always be covered with iron. The pitch of roof should be about 40o. Contractors rates for shingles cut on the estate are Rs. 2/8 per 1,000.

Where bamboo is scarce Mullotar planks will

do for walls of coolie lines and will last 3 or 4 years.

Receipt for putty—Whiting 9, White lead 1 Linseed oil until stiff, to keep soft add Lucca oil (Spons).

CHAPTER XII.

ROADS.

In repairing roads always slope them in to the hill and have cross drains at intervals. If the roads are sloped out the ponies often slip off them in the rains which is no joke, as there is often a bad drop on the outside. Stone all bridges, it is cheaper to do so, as stone bridges last for years, whereas wooden bridges are always breaking in. It is always safer to close your roads once in a year to prevent there being a right of way claimed. Repair the roads in November, so that they all get well trodden down before the heavy wash of the rains commences. Any landslips should be stoned up and planted with bamboos or semul, and all jhoras

kept clean as if they are blocked, and there is a sudden heavy fall of rain, many of the bridges will be washed away. In making new roads line them out, with a very slight rise and stake up every 20 or 30 yards. A European's and Native's idea of a good road is very different, always remember that it depends chiefly on the roads whether your work is hard or easy, as if the roads are very bad, it takes as long again to get from one part of the garden to the other, and steep roads will wear the ponies out in no time, so always give as much time and trouble as you can to make new roads.

CHAPTER XIII.

GARDEN IMPLEMENTS.

A large quantity of tools of all sorts should be kept in stock. It is a great mistake to try to economise by making old tools last for years as bad implements mean bad work. Pruning knives ought to be renewed every other year, the extra

work a coolie will do with a good knife will very soon pay the knife's cost. Big pruning knives will be wanted for cutting down. In buying these knives, get them with very long handles, as they give more purchase. Small knives will be required for light pruning. There are 3 or 4 sorts of hoes used up here, the Elephant hoe is too big, and the narrow hoes used on some closely planted gardens do poor work. A medium sized hoe, not too heàvy, is most used for general work. Four pronged forks are best. The fork hoes are useful when opening new land, but if used on closely planted gardens tear the roots out badly. Old worn out hoes can be always utilized for tullies and holeing. Although many gardens have given up hoeing and gone in for forking entirely, it is doubtful if the forking makes so much difference as is imagined, and on sandy ridges they are nearly useless, as all the soil falls between the prongs instead of being lifted up hill. B. Y. hooks are the best for sickling. The sickles must be frequently renewed, as when they get worn down they do not cut properly, and in

consequence, half the jungle is only trodden or beaten down instead of being cut; one reason, why sickles wear out so soon is that the coolies use them to cut their fire-wood. Neither English nor American axes are much good up here, as the coolies cut very well with their own wedge shaped ones. In Chota Nagpore the coolies have to provide their own tools. There is no reason why this should not be down here. At present any amount of tools are lost through coolies bolting with them, and the only remedy is making the sirdars buy new implements to replace those lost, but most of the sirdars manage to get hold of some of the worn out articles, and give these in when the tools are called for. Two baskets and two ghooms will have to be given to each coolie, the first ones at the beginning of the year, the 2nd about the end of July. A complete set of tools will be wanted for the engine room and spanners, duplicate piston rings, guages glasses, plugs, packing, &c., should always be kept ready. Watering cans can be made on the estate from old paint tins. Solder should also be made on the estate, Receipts,—(1.) 1 Part Lead, 1 Part Tin: (2.) 1 Lead, 2 Tin: (3.) 1 Tin, 25 Lead. The cuttings from the box lead can be utilized Box covers can be made by the garden Dirzees if a pattern is given them, waterproof the box covers by soaking in a solution of water and 20 parts soap, afterwards in a solution of water and

20 parts Sulphate of Copper.

CLIMATE.

Tea seems to grow in any climate, and some of the gardens in Darjeeling which are at an elevation of 6,000 feet still pay well and give 4 maunds an acre, the frost and snow seeming to do very little damage to the China plant, although the Assam plant suffers badly. One reason of these gardens doing well is the tremendously heavy rainfall they get, but the liability to get hail will more than counteract this advantage, and if cold weather is experienced in the rains the flushes will be delayed or lost. The hot steamy climate of the Dooars is specially suited to tea, and very large outturns are made. In one or two cases, 12 maunds per acre, The most unhealthy climates are those in which tea does best Hot steamy days and rainy nights suit tea better than any other weather. Hail, except in very exceptional cases, does not do half the harm, it is supposed to do; if it takes off the first flush, the 2nd flush is always very heavy and will nearly make up for the loss of the 1st; of course, if it barks the trees, or if there is another fall of hail during the 2nd flush, the damage is irretrievable. But as a rule the damage done is exaggerated and in many cases in spite of the hail more than the estimated yield is made. A large rainfall is wanted, say, from 95—120 inches.

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Acreage. ..	120	130	50	70	80
Yield of Tea	600 mds.	620 mds.	300 mds.	140 mds.	240 mds.
Average per acre	5 mds.	4 mds.	6 mds.	2 mds.	3 mds.
How pruned	Medium, well cleaned out.	Lightly.	Up and down left 4 inches wood.	Cut Heavily.	Cut heavily in May.
Cost of pruning	Rs. 960	Rs. 650.	Rs. 300.	Rs. 280.	Rs. 320.
Average per acre	Rs. 8	Rs. 5.	Rs. 6.	Rs. 4.	„ 4.
Hoed ...	4 times.	4 times.	4 times.	Once.	3 times.
Sickled ...	3 tlmes.	3 times.	3 times.	6 times hand weeded.	5 times.
Blight ...	Red spider in June.	Green Fly badly july	No blight.	Red spider April May Mosquito August.	No blight.
Soil ...	Black Loam.	Marshy Clay subsoil.	Fair soil.	Soil much washed away.	Very rocky good soil.
Lay of Land	Good slope	Fair slope.	Good slope,	Very steep.	Rather steep.
Best Flush ...	3rd.	1st & 2nd	3rd.	3rd & 4th.	1st & 3rd.
Vacancies ...	5 per cent.	10 per cent.	5 per cent.	20 per cent.	25 per cent.
Seedlings planted.	...	...	..	42,000.	60,000

Weather fairly favourable. Little drought at beginning of season and very heavy rain during July and August, beginning of season a little too cold. Total rainfall 102 inches.

FOR 1887.

No. 6.	No. 7.	No. 8.	No. 9.	No. 10.	TOTAL.
40	100	4 yrs. old 50	3 yrs. old 50	2 yrs. old 50	740 acres.
320 mds.	250 mds.	150 mds.	25 mds.	..	2,545 mds.
8 mds.	2½ mds.	3 mds.	½ md.	...	3 mds. 16 srs.
Levelled leaving two good eyes.	Thinned out & bad work cut low.	Cut back to 2 feet.	Cut to 1 ft. 6 inch.	Cut to 10 inches.	
					Rs. As. P.
Rs. 400	Rs. 800	Rs. 100	Rs. 50	Rs. 12	3,872 0 0
„ 10	„ 8	„ 2	„ 1	„ ¼	5 3 8
6 times.	Once.	3 times.	Once hand weeded.	Once hand weeded.	
...	6 times hand weeded.	4 times.	Once hand weeded.	Hand weeded.	
Mosquito at end of Sept. and in October.	Red spider, green fly badly.	No blight.	No blight.	A few Red beetles.	
Sandy Loam.	Very little top soil.	Good soil sandy subsoil.	Soil fair to good Rocks under surface.	Clayey subsoil.	
Nearly flat.	Steep Rocky.	Good slope.	Medium land 10 acres terraced	All terraced steep.	
3rd & 4th. Full.	1st. 20 per cent.	2nd & 3rd 5 per cent.	3rd & 4th. 10 per cent.	... 20 per cent.	
...	10,000	14,000	20,000	40,000	186,000

Total cost of hoeing ... ... Rs. 6,250.
Total cost of jungle cutting ... „ 3,400.

CHAPTER XIII.

MANAGEMENT.

To manage a Tea Estate properly it is necessary to have some slight knowledge of many trades. As although in many cases assistance will be given willingly by neighbouring planters, still it often happens that in cases of emergency the manager has to depend entirely on himself. A European ought to be able to look after a garden which produces 1,000 maunds without help or with assistance from a Moonshee or Baboo. These Natives have often been doing nothing but Tea work for 20—25 years and are quite as useful as an ordinary European assistant, and an assistant's salary makes a great deal of difference in the yearly expenditure. When a garden produces over 1,200 maunds an assistant will be necessary and on large estates making over 3,000 maunds, a regular European Tea House assistant should be employed. Four rupees a maund is a very fair allowance for European Establishment. Most hill gardens give pony

allowance, this is much cheaper for the proprietors as the wear and tear of the ponies is great on steep gardens. The allowance is generally Rs, 25 a pony a month, some few estates allow Rs. 31. A regular garden Diary should be kept by every manager or what is better a sheet like the one on reverse. In event of the manager of a garden going on leave or joining another estate, the new manager is at a very great disadvantage until he gets to know his new charge thoroughly and it often happens that a planter who has been successful on his former charges, does badly for a year or two, through not knowing the peculiarities of the garden he joins. Certain patches of tea may be particularly subject to blight, the soil vary much in different portions, or rainfall be very short. So if on taking over charge of a garden he finds a proper account of all the work that has been done for years with the results attained, it is a very great help to him. On some estates the manager looks after garden, and assistant factory, and on others assistant garden, and manager factory. In either case if the work is being done

well, interfere very little with the assistant and on no acconnt give orders to Natives if the assistant is on the spot as it only lowers him in the eyes of the coolies. Of course, sometimes it is necessary for the manager to take entire charge of the work himself, but this will only be if orders are not carried out properly or the work is really bad, both managers and assistants should have one day's holiday a week, the man in charge of Factory always being able to take Monday. In slack seasons it is as well do go a round of as many gardens as you can, the paying estates being well looked over, as different styles of pruning are done on most gardens and there are often new ideas in sifting or in drying teas, and as new machines are brought out all these things can be looked into and compared with one's own system, and very often a good deal is learnt. Do not have too many different sorts of work going on at the same time and keep the coolies as much together as possible. A manager should always go round the work once a day. On very large estates this may not be feasible, but can be done

anyhow every other day. Even in the manufacturing season one can always manage to go round a large portion of the garden before the leaf is ready to be fired. In the pruning season have all coolies counted up in the evening as well as the morning. During the plucking season there is always a check on coolies by the amount of baskets weighed, but many of the pruners will go to their houses after the morning muster is taken. All accounts and books should be kept by the manager, and pay or advances given out by him personally to sirdars, this being a good time to redress any grievances or settle disputes. Keep a daily account of expenditure as items may be forgotten.

PRIVATE GARDENS.

PRIVATE gardens (if they are not financed) invariably pay well. The chief reasons being that the agents' changes are less, and that no useless buildings are erected, and that if the owner is manager he has what labour he likes and is not limited to a fixed expenditure, it being im-

possible for anyone off the garden to tell what labour will be required. Also that advances are given on contracts in October or November, by this getting charcoal and wood at cheaper rates.

Another reason is that the managers and assistants are very seldom changed, if they work properly, and as both men get good pay and good commission they stick to the work.

CHAPTER XIV.

FOREST CONSERVANCY.

The supply of timber in this district, for either firewood, charcoal, or building purposes, is getting low, and on most gardens represents a large amount in the estimates. In most cases the wood has to be cut in Government Forests, but the demand is so enormous round the station (over 6,00,000 maunds) that the Forests will be unable to bear the strain for long. When this supply ceases most gardens will be placed most

awkwardly as the timber left on the estate will only last for a few years, and only in a few cases will water power be available to work the machinery. Every planter ought to plant 5 or 10 acres of trees yearly. The question is what trees had better be planted. Quick growing ones should be chosen. Semul (Bombax Malabaricum) grows very quickly, strikes readily from cuttings and comes on well from seed. The wood is very soft but does very well for tea boxes and for planks, which will only be used for a short time. All cuttings or seedlings should be planted at as low an elevation as possible.

Mullotar (Macaranga) another very fast growing tree is useful for tea boxes and walls of coolie lines. Wood will not last long.

For fire-wood the Kooail (Sponia Poletoria) would do well, it is not a large tree, but grows very quickly and germinates well. If 10 acres of this tree were planted 10 by 10 feet, it would keep a garden in engine wood entirely after 3 years, or at most 4 years. A single tree would

not probably weigh more than 10 maunds, which would give 4,300 maunds per acre. The trees want very little looking after, and seedlings spring up by themselves wherever the trees have been cut down. In many cases this tree dies off after 3 or 4 years, but even then the wood comes in for fire-wood. The wood burns very well and gives out a large amount of heat, but it burns quickly and is light. It could be planted out anywhere, in old native cultivation near the factory would save carriage.

Tooni (Cedrela toona) has been planted on many estates. This tree does not grow quickly and is very subject to Mosquito blight, which strips it of leaves. And some planters believe that it really brings on Mosquito blight. On several gardens it has been planted along the roads, but many of these trees now 10—12 years old are only about 15 feet high. This tree certainly does not come on in the open, but might do better if planted in heavy jungle.

Most of the trees from which building timber is cut are slow growing. Good trees to plant

would be Peplee (Bucklandia propulnea), Souar (Betula cylindrostachys), Chelone (Schima Wallichii), Kimbo (Morus serrata), Champ (Michelia excelsa). Bamboos are common on most gardens but where wanted can be planted in long hedges in the native cultivation, a stem with small piece of root should be planted. The three best kinds for this district are: 1. Mal Bas (Bambusa nutans),—a large bamboo, grows to great hight: for coolie lines and cutcha roofs. 2. Maling (Falconeri)—a smaller bamboo used for baskets, mats and horses' fodder. 3. Filing,—baskets and mats.

The best trees for ornamental purposes are—

Mowa (Engelhardtia spicata), Peplee (Buklandia populnea), Cryptomeria Japonica.

SUN-GRASS.

If an acre of sun-grass is planted out every year, it will save the garden a great deal of expense. The grass will grow in almost any soil providing it is not too dry. The time to plant is

at the beginning of the rains, near the coolie lines will save carriage. Very little trouble need be taken, as if the roots are covered over with soil and cattle kept out the grass will spread very quickly. It should be burnt once a year at the end of January or beginning of February. Grass should be cut in December or January.

Appended to this is a short list of the most common trees in this district with their uses.—

A few of the common trees of this district.

NEPALESE.		Color of wood	Grain.	USED FOR.
Budgrat, Buk	Oak, Quercus Camellosa	Brown black	Hard	Building timbers & charcoal &c.
Sal	Shorea Robusta		Very hard	Building timbers, charcoal &c.&c
Kimbo	Mulberry, Morus Seratta	Yellow brown	Hard	Good timber.
Okor	Walnut, Juglans Regia	Black	,,	Furniture, Timber, shingles.
Champ	Magnolia, Michelia excelsa	Yellow	,,	Furniture and timber.
Tuni	Cedrela Toona	Red	Soft	Boxes furniture, building, shingle
Peple	Bucklandia Populnea	,,	Hard	Timber, charcoal.
Panisagh	Terminalia Myriopteron	White	Fairly hard	Timber and charcoal, boxes.
Chelone	Schima Wallichii	Red	Hard	Posts in groand, timber, charcoal
Cartouche	Chesnut, Custunia	White & red	,,	Shingles, building and charcoal.
Lumpatie	Duabanga Sonneratoides	White	Soft	Boxes and timber.
Copasse	Maple, Acer hookeri	,,	Hard	Charcoal and timber.
Souar	Birch, Betula Cylindrostachys	,,	,,	Timber.
Cerise	Albizzia Stipulata	Red	Soft	Fire-wood.
Semil	Bombax, Malabaricum Cotton	,,	Very soft	Thin planks.
Lava	India Rubber, Ficus Elastica	White	Soft	India Rubber and Bark.
Hatti Pili	Pterospermum Acerfolium	Red	,,	Charcoal, leaves for Ghooms.
Mullotar	Molotus	White	,,	Fire-wood, planks for coolie lines
Goial	Calicarpa	,,	,,	Fire-wood, posts, small bridges.
Kooail	Sponia politoria	,,	,,	Do. bark.
Kanhya	Ficus Cunia	Red	,,	Do.
Gokul Dupe	Cunarium Bengaleuse	White	Very soft	Planks, boxes.
Uthese	Alder Alnus Nepaleasis	Yellow	Soft	Fire-wood, boxes.
Felletta	Erythrina	White	,,	Do.
Lallie	Laurel, Gironniera Thomsoni	Red	Hard	Timber, charcoal.
Lepcha Phul	Laurel, Phœbe attenuata	White	,,	Do. Do. Fruit.
Gobira	Echinocarpus dasycarpus	Brown	,,	Do. Do. Boxes.
Sag	Terminalia tomentosa	,,	,,	Building.
Mowa	Engenhardtia spicata	White	Soft	Boxes, planks.

There are several different kinds of Tuni, Cerise and Cartouche, but they are very hard to identify.

Estimate for 450 *acre Garden,—Outturn* 1,700 *maunds.*

Work.	Rate.	Cost.		Remarks.
		Rs.	Rs.	
European Est....		7,200	7,200	Manager Rs. 450 Assistant „ 150
Engineer ...		200	200	
Medical Fees ...		200	200	
Native Est. ...		2,200	2,200	
Cultivation a/c—				Total cost of Cultivation per acre Rs. 19-14-10
1 deep hoe ...	@ 3/4 ₱ acre	1.462		
3 light hoes ...	„ 1/10 „	2.193		
3 jungle cuttings	„ -/12 „	1,013		Leave 4 inches new wood, thin out well.
Pruning ...	„ 7/- „	3,150		
Transplanting...		600		30 maunds seed to plant.
Nurseries ...		300		
Roads ...		250	8,968	Including drains and bridges.
Manufacture a/c-				Manufactured at just under Rs. 6-9 per maund of pucca tea.
Plucking ...	@ 1/6 ₱ md.	2,400		
Sorting ...	„ -/8 „	850		
Tea-makers ...		1,600		
Transport ...		1,800		
Box-wood ...	35,000 ft @ 50-	1,750		Tea boxes and all stores Boxwood ⅝ tooni.
Charcoal ...	2,500 mds -13	2,031		
Engine wood ...	3,500 „ 12-8	437		
Baskets, &c. ...		250	11,118	Including ghooms and mats.
Building account—				
Coolie lines ...		1,150		Including sungrass & stables.
Repairs to house and Factory...		200	1,350	White-washing, plastering.
General ...		150	150	
Stable ...	4 ponies at 25 a month each	1,200	1,200	
Road-cess ...		320	320	
Up keep 20 acres 2 years ...		500	500	These items are heavy but require most careful work
Planting 20 acres		750	750	
Exchange act.	@ -/8 ₱ 100-	172	172	
Sundries ...		50	50	Factory paper, cloths, stamps &c.
		34,378	34,378	

Total local Expenditure Rs. 20-5 annas per maund, pucca tea,

ESTIMATE.

In making an estimate always rather under-estimate the outturn and over-estimate the expenditure. As if the proposed outturn is not made or if too much money is spent, the owners are sure to be put out; whereas if an extra amount is made for a smaller expenditure, the manager will get kudos. The cost of cultivation will vary much in wet and dry years and never can be estimated for exactly, roads may want extra repairs, more charcoal may have to be used and a hundred things happen which may increase the expenditure. Tea should be made for about Rs. 20 a maund, or less, if there is no new cultivation. When a garden makes 4½ maunds an acre, a coolie an acre will be wanted, but when gardens can only turn out 3 maunds per acre, 2 coolies ought to do for 3 acres. But at the same time, if an increase is expected, it is better to err on the side of having too many coolies, as if the leaf once gets away, it will be very serious loss. Nearly every garden in the

district ought to make 4 maunds per acre and some of the better gardens at least 6 maunds. It is false economy to try to work a garden too cheap, as from want of cultivation the soil gets hard, the jungle seeds, and the year after will give much trouble, and what is saved one year will have to be spent the next.

THE END.

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