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No. XXIII.

REPORT

UPON THE

PRESENT CONDITION AND FUTURE PROSPECTS

OF

TEA CULTIVATION

IN THE

North-West Provinces and in the Punjab.

Calcutta:

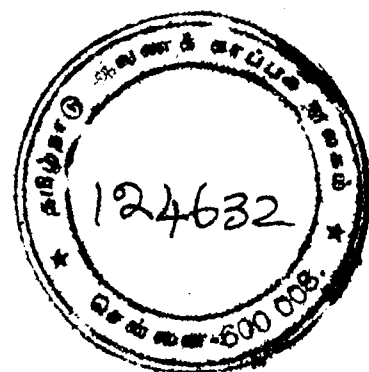
JOHN GRAY, "CALCUTTA GAZETTE" OFFICE.

1857.

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REPORT

UPON THE

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KUMAON PLANTATIONS.

1. This place is situated eight or ten miles to the Eastward of Nainee Tal, and is at an elevation of about 4,500 feet above the level of the Sea. It consists of a succession of terraces reaching from the bottom to the top of a small Hill; the soil is composed of light loam mixed with small pieces of clay-slate and trap or green stone, of which the adjacent rocks are chiefly composed.

In 1851, when I visited this Plantation, it covered about four and a half acres of land. Since that time it has been extended down to the bottom of the Hill, and may now be about six acres in extent. The bushes are in excellent condition, and fully justify the favorable opinion I formed of the Plantation on my first visit. I then stated, in my Report to Government, that "both the situation and the soil of this Plantation are well adapted to the requirements of the Tea shrub." The centre portion of the land, about half way up the Hill, is particularly worth pointing out as an example of what I consider most excellent soil for Tea cultivation.

A large tract of land in the Hills adjoining Bhurtpoor has been set apart for the extension of this farm. A portion of this has already been cleared and a few acres planted; the remainder is covered with Oak tree chiefly and various kinds of brushwood. Much of this new land is exceedingly steep and precipitous, and has never been under cultivation

of any kind. The soil and sub-soil varies in different parts, but generally consists of light vegetable mould, which has been gradually formed by decaying vegetation. It is densely mixed with small and large pieces of clay-slate and other stones, which frequently come up to the surface.

But there are other portions of the land where the soil is a yellowish loam, moderately rich in vegetable matter, and similar in many respects to that of the best portion of the Bhurtpoor Plantation.

Viewing this land as a whole, therefore, it is not difficult to foretell that large portions of it are unsuitable for the cultivation of Tea. Many parts are much steeper than any good Plantations I have met with in China, and from the formation of the soil and the nature of the rocks I am inclined to think the plants would suffer much from dryness at certain periods of the year.

But these objections apply only to certain portions of the estate. I have already stated that there are many other parts where the soil is similar to that of the best portions of the original Plantation. These tracts are generally less steep than the others, and altogether are well adapted for the cultivation of the Tea shrub. From my experience of Tea cultivation in China, and from the satisfactory results in the Bhurtpoor Plantation adjoining, I would advise the clearing and planting of these tracts in the first place, instead of a general clearing and planting indiscriminately all over the estate. These good lands are very large in extent, although, perhaps, small in comparison with the remaining portion which has been set apart for Tea cultivation. No doubt the Tea plant might be made to grow over the whole of the estate, and on the most barren parts the produce would probably be of the finest quality; but I do not think the crop would be remunerative.

These views were fully explained to Mr. Milner, Assistant Superintendent of the Tea Plantations; and that gentleman was requested to communicate them to Dr. Jameson, who was daily expected to visit Bhurtpoor.

In my former Report to Government it was necessary to express an unfavorable opinion on some other Plantations in this District, where the land which had been chosen was not suitable for Tea. Since that time these Plantations have been very properly abandoned, and the land returned to the Natives for the cultivation of Rice and other crops, for which it is well adapted.

2. These Plantations are on a Hill side near Almorah, about 5,000 feet above the level of the Sea, and together cover about seven acres of land. They were very favorably noticed in my former Report. The soil is light and sandy, and wherever it is of sufficient depth it is well adapted for Tea cultivation. The bushes, generally, are in good health, and for many years past have been yielding large crops of Tea. Of the two, Kuppeena is at present in the best condition; many of the plants in Lutchmesir appear to be getting too old and require to be renewed.

3. These farms are situated about six miles North-West from Almorah, at an elevation of 4,500 feet above the Sea. In 1854 Dr. Jameson states that Hawulbaugh covered fifteen acres, and Chullar thirty. The former has always appeared to me well-adapted for Tea cultivation, both on account of the soil and also from its undulating character. As the best portions, and on which the bushes are in the finest order, I may direct attention to the ground from the large tank up to the Chinese tombs, and particularly to that between the tombs and the Carpenter's shops, and also to those portions South and West of this. The worst land on the farm is that on the West side of the Tea factory.

While I readily admit that many portions are in a most satisfactory condition, I think it is yet capable of being greatly improved. The numerous fruit and forest trees which have now grown up in the Plantation are no doubt very ornamental and add greatly to the beauty of the place; but they do great injury to the Tea plants. The greater part of the coniferous trees, such as Deodars, &c., ought to be cleared away, and all the worthless varieties of fruit trees weeded out. There is plenty of room for retaining the finest kinds of fruit trees and a few ornamental forest ones here and there, for the adornment of the place, without doing injury to the Tea Plantation.

It is also worthy of the remark that the younger portion of some Plantations here do not seem to have been planted with that care and judgment which is necessary. In many instances the plants appear to have been thrust into the ground without the land having been previously prepared for their reception, and in others they have been planted in places where there is no depth of soil. The consequence of this is there are many blanks in the newly planted land owing to the depth of the plants, and the little labor which had been spent upon them had

only been thrown away. The Overseer of a Tea Plantation ought to have impressed upon his mind that it is much better to plant a small portion of the land well than a large portion hurriedly and without judgment.*

An improved method of gathering the leaves would be the means of greatly improving this Plantation, and would render it much more vigorous and productive. At present too many leaves—and many of them old and worthless for Tea-making—are taken annually from the plants,—a system which has the effect of stunting them and stopping their growth. I shall explain this matter more fully in the end of the Report, for it is a subject of very great importance.

By these simple means, *viz.*, thinning the fruit and forest trees, cultivating the land well before planting, planting carefully, and above all attending carefully to the plucking, this Plantation, flourishing as it is, will be rendered much more vigorous and productive.

In the Chullar farm adjoining, some portions of the higher land are in very good condition, such, for example, as those below the Tea factory and houses occupied by the Chinese; but the greater part is too wet. The water during the rains seems to ooze out everywhere, and would probably be difficult to drain. Perhaps the best method to adopt in the circumstances would be to plant only on dry land, and on land moderately rich and having a soil of sufficient depth. Land is abundant in all directions about Almorah, which is much better suited for Tea cultivation than most parts of Chullar.

4. A large tract of land has been taken up near the head of the Kutyoor. Byznath Valley, about 35 miles Northward from Almorah. This land extends from a stream in the bottom of a Valley up to the top of the Hill on the North side. Its surface is generally undulating in character, and consists of numerous ridges and furrows running from the top of the Hill down to the stream. The soil in this extensive tract of land varies much in its nature and composition. In some places it is a stiff clay, while in others it is loam, darkened and enriched by vegetable matter.

A considerable portion of this farm seems well-suited for the cultivation of Tea. Wherever the soil is deep, moderately rich, and *not*

* It is but just to remark that the present Overseer, Mr. Mooney, has been only a few months at Hawulbaugh, and consequently is not in any way to blame.

marshy, the Tea plants, properly cultivated, will flourish admirably. A Plantation of great extent may be made here, if such portions only are selected and planted.

But there are other parts of this farm—and extensive ones—on which it is not advisable to attempt this cultivation. For example, much of the higher land, particularly on the ridges just noticed, has no depth of earth, the clay-slate rock comes quite up to the surface, and may be seen jutting out in all directions. Again, in the low ravines, although the soil is rich and well adapted for Rice cultivation or dry weather crops, it is much too wet for Tea.

If these suggestions are attended to, and if the suitable portions of this land are well planted in the first place and properly managed afterwards, I have no doubt there will be a flourishing Plantation here in a few years.

GURHWAL PLANTATION.

This Plantation is in Eastern Gurhwal, near the village of Paorie, in Latitude 30° 8' North, and Longitude 78° 45' East. Guddowli.

It consists of a large tract of terraced land extending from a ravine in the bottom of a valley to more than 1,000 feet up the sides of the mountain. The lower portion of this land is said to be about 4,300 feet above the Sea, while the top of the surrounding mountains are from 7,000 to 8,000 feet.

In a large Plantation of this kind the soil is, of course, very varied in its composition. In some places it consists of a mixture of loam, sand, and vegetable matter, is deep, and altogether well-suited for Tea cultivation. In other parts it is stony, extremely shallow, and scarcely worth the expense of bringing under cultivation. Much of the higher portion of the farm, planted apparently within the last four or five years, is of this description.

In the lower part of the Plantation, on spots where the soil is moderately deep and rich, the plants are succeeding very well and yielding fair crops of Tea. As an example of excellent Tea soil, I may point to a small portion of the Plantation lately planted about half a mile from the work-shops and out-houses on the road to the Overseer's house. Here the plants are growing admirably, and are quite equal to any Plantations of the kind I have met with in China.

But viewing the Guddowli Plantation as a whole, I was rather disappointed with it. The plants are generally small and have a stunted appearance, and are certainly not in a condition to yield remunerative crops of leaves. This remark applies more particularly to the upper portions of the Plantation. The poverty and shallowness of many parts of the land has no doubt much to do with this state of things; but it appears to me that the bushes have been subjected to the system of hard plucking, to which I have already alluded and condemned, and which they cannot stand for any length of time and remain in health.

In order to improve the condition of this Plantation and render its crops remunerative, I suggest,—*first*, a judicious selection of land; *second*, careful planting and cultivation; and *third*, a different system of gathering the leaves.

The propriety of carrying this Plantation higher up the mountain appears to me exceedingly doubtful. In the upper portions of the present Plantation I observed many of the bushes covered with moss and in bad health, indicating apparently a want of sufficient heat *during the summer months*. I have no experience in this matter, and do not feel certain that my supposition is a correct one; but it is worth the consideration of those who are engaged in Tea planting amongst these mountains.

DEYRAH DHOON PLANTATIONS.

This farm is situated on the West side of Deyrah, and extends over 400 acres of land. The soil is composed of a mixture of clay, sand, and vegetable matter, varying in depth, but generally deep enough for Tea cultivation. It rests on a gravelly sub-soil, consisting of lime-stone, sand-stone, clay-slate, and quartz rock, or of such rocks as enter into the composition of the surrounding mountains.

When I inspected this Plantation in the spring of 1850, it was far from being in a flourishing condition. In my Report, sent to Government in the autumn of that year, I remarked:—"The plants, generally, did not appear to me to be in that fresh and vigorous condition which I had been accustomed to see in good Chinese Plantations." Many of them had a stunted and unhealthy appearance, caused apparently either

by the land or climate being unsuitable, or by the peculiar method of cultivation then in practice.

In consequence, I believe, of the suggestions contained in that Report, the system of cultivation has entirely changed. The trenches in which the plants were planted, were filled up, irrigation was discontinued, and more judgment was exercised in gathering leaves from very young plants. In fact the China system of cultivation was followed as far as it was understood, and the result of all this has been most satisfactory.

The labor establishment has hitherto been much too small to cultivate 400 acres of land in a place like the Dhoon. Most of the land was formerly a jungle, and even now it is difficult to get rid of a rank growing species of grass indigenous to this part of the valley. Although, therefore, nearly the whole of the farm has been planted, there is only a small portion comparatively, which may be said to be really under cultivation. The remarks I have to make upon the Plantation will, therefore, apply only to the Eastern portions of the farm and to the original nursery at the upper end.

I have great pleasure in stating that I have never seen finer or more productive Plantations in China. The plants are in high health, large and bushy, and are yielding annually abundant crops of leaves. Many of the bushes are five and six feet in diameter. One I measured was eight feet, another ten, and both six feet in height. Of course these are the giants of the Plantation. And it is to be noted that these plants are not "drawn up" with few branches and leaves; but they are dense bushes in high health, and formed to give large quantities of Tea.

These results have entirely removed any doubt I formerly had regarding the locality as suitable for the cultivation of Tea. The Superintendent, Dr. Jameson, and his Overseer, Mr. Thompson, deserve the highest praise, not only for the present state of this portion of the Plantation, but also for the ready manner in which early and erroneous system of cultivation were abandoned for one which has produced results so satisfactory.

With regard to the other portions of the Plantation which have not had a sufficient amount of labor expended upon them, I may remark that, however excusable it may be to endeavor to cover with plants a large portion of land which has not been properly prepared for them, yet the system is wrong. It is very unsatisfactory in the end to have

the plants choked up with weeds and many of them destroyed ; beside it is always more expensive to have to cultivate land after planting instead of before.

THE PUNJAB PLANTATIONS.

1. This Plantation is situated in the Kangra Valley, about nine miles from the Old Fort, and covers Nagrowta. apparently about four acres of land. It was planted in 1847, and consequently has been in full bearing for several years. In 1855 it produced 1427lbs. of Tea, or about 330lbs. per acre. The soil is a brownish loam, moderately rich in vegetable matter, and well suited for Tea cultivation. The plants are healthy and vigorous.

2. This is another small experimental Plantation further to the Eastward in the same valley, and about twenty Bowarnah. miles from Kangra. It appears to be five or six acres in extent, and was planted about the same time as the former. It is consequently in full bearing, and yields annually upwards of 300lbs. per acre. It is to be remarked, however, that a considerable portion of the produce of both these Plantations is made up from old leaves, which had much better been left on the bushes.

The soil of Bowarnah is a brown loam, not quite so rich as that at Nagrowta, but contains a larger portion of sand, and is equally well suited for the cultivation of the Tea shrub. This Plantation is also in a flourishing condition at present.

3. The success which had attended these two small Plantations just noticed, induced the late Governor General, Holta. Lord Dalhousie, to comply with the wishes of Doctor Jameson to extend the cultivation of Tea in this part of the country. Accordingly, the lands at Holta were set apart for this purpose. Holta is about 26 miles North East from Kangra, at the foot of the high mountain range, and nearly 4,000 feet above the level of the Sea. Here snow falls annually and covers the ground for several days at one time. The high mountains behind are white with snow for the greater part of the year.

The extent of this Plantation is stated to be about 1,200 acres, and of these 700 are already under cultivation. About 20 acres were planted in January 1852, 300 in 1853-54, and 380 in 1855-56. As the land

has not been measured, I merely give these statements in order to give a general idea of the Plantation, but do not vouch for their being exactly correct. However, this is not of much importance as regards the present Report.

This extent of land is bounded on the East and West by two mountain streams which have their sources amongst the snows of the Chumba range. It is very undulating in its general formation, and consists of numerous spurs running out from the mountains, dipping to the South, and sloping gently to the Eastward and Westward. Everywhere it is abundantly supplied with streams of fine water, which flow from the mountains at all seasons of the year, and which are most useful in dry seasons, like the last, where newly-planted plants are apt to suffer from drought.

The original soil of this Plantation has been a yellow clay ; but near the surface it is now rich in vegetable matter. The land appears to have been lying waste for several generations, or only used for grazing purposes, and consequently has been enriched annually by decaying vegetation which it produced, and by the excrements of animals. These annual deposits have gradually enriched the soil, and at the present time it has assumed a darker hue near the surface. Here and there, on the side of some of the ridges, I observed the red clay appearing on the surface ; but generally it is such as I have described. On the whole, I consider it admirably adapted for Tea cultivation. The plants will, no doubt, grow better and more luxuriantly on the richer portions of the land ; but nearly the whole is well-suited for the purposes to which it has been set apart.

The condition of the plants upon this Plantation is highly satisfactory ; they are healthy, vigorous, and quite equal to the best Plantations I have seen in China. The cultivation (with two exceptions which I shall notice) appears to me to be carried on upon the most correct principles ; the system of irrigation, which I condemned in my former Report upon the Kumaon and Gurhwal Plantations, has been avoided here, and with the most satisfactory results. Upon the whole, I am inclined to think this Plantation the most promising of all under Dr. Jameson's management, and it certainly reflects great credit both upon him and his Overseer, Mr. W. Rogers.

Of the two exceptions to which I have alluded in the last paragraph, the latter will be ultimately found of great importance, not only as

regards this Plantation, but with reference to all the others, and ought to be brought under the notice of the various Overseers in a most prominent manner. In the Holta Plantation many of the plants are planted in trenches or terraces, in order to check the rush of water during the rains. When this is necessary, the terraces ought in all cases to be made at right angles to the slope of the hill. If trenches or terraces are made direct down the hill, instead of across it, they only form a channel for the water, which in rushing down will carry away the soil from the roots of the plants. On the greater portion of the Holta Plantation the slopes are so gentle that ridging or terracing seems unnecessary.

But the second point,—and one to which I think it necessary again to direct particular notice,—is the native method of gathering the leaves. In the Holta Plantation, and in nearly all the others which I have examined, the bushes are too hard plucked, and many *old leaves* are taken off as well as the young ones. In the anxiety to show a large return in one year—which is quite natural and perhaps excusable—a great amount of injury is done to the plants, which, if continued, will soon begin to tell upon their health and future productiveness. I consider this matter of very great importance to the future welfare of Tea cultivation in India, and I have not failed to communicate my views on this subject to Dr. Jameson, who will, no doubt, direct his attention to it, and at the same time I shall explain the matter more fully in its proper place in this Report.

I have thus endeavoured to describe the various Tea Plantations in the North West Provinces and in the Punjab, and have offered suggestions for their improvement where I consider it necessary to do so. Upon the whole they are in a most satisfactory condition, and prove beyond all doubt the fitness of these Provinces for the cultivation of Tea.

FUTURE PROSPECTS OF TEA CULTIVATION IN THE HIMALAYAS.

From the description which I have given of the Government Plantations it will be observed that the experiments have proved that the Hills in these Provinces are well adapted for the cultivation of Tea. And further, I believe that its cultivation, if carried on in a judicious manner, will prove an excellent investment for foreign capital. But a knowledge of the habits of the plant, and of agriculture or horticulture is, in my

opinion, indispensable to make success certain. In every trade and profession of life, a course of teaching is considered indispensable to success. The lawyer, the doctor, the farmer, and the gardener have all to devote long years of careful study to their profession before they will be trusted by the people whom they wish to serve. And I believe it is a rule with the Indigo Planters in Bengal and Tirhoot to make their young men study for some time on their estates before they can be entrusted with the entire management.

But, somehow or other, in India every man seems to think himself qualified to undertake the management of Tea cultivation, without having any knowledge of the subject whatever. I have even heard it stated that a lady had, at one time, offered herself a candidate to manage one of the Government Plantations. No doubt she may have been properly qualified for any thing I know to the contrary; but I think this is hardly probable. I can only account for this by supposing that there is a charm about the name of our national beverage which has a tendency to mislead the judgment of persons who are, in other respects, rational and intelligent. Although I readily admit that many persons possessed of sound sense and judgment might, by chance or careful observation, hit upon the right mode of management and succeed, yet I fear the majority of such persons would fail, and I therefore make these observations for their careful consideration. Having thus stated my views upon this point I shall now offer some suggestions for the consideration of Government and of those who may be inclined to embark their capital in Tea cultivation.

1. It is a fallacy to suppose that Tea can be cultivated profitably on poor land where nothing else will grow. I drew attention to this point in my former Report, and stated that "Tea, in order to be profitable, requires a good sound soil: a light loam, well mixed with sand and vegetable matter, moderately moist, and yet not stagnant or sour," was instanced as most suitable for the requirements of the Tea shrub. There is no scarcity of such lands in the Himalayas, and if such are chosen, success is certain, in so far as the land is concerned. It will, perhaps, be better for me to explain what I mean by again pointing out certain portions of the different Government Plantations, where the soil appeared to me particularly well suited for Tea cultivation, and these spots can be examined by any one desirous of acquiring a knowledge of this kind. Thus the centre of

On the selection of
Land and Cultivation.

the Bhurtpoor Plantation, near Bheemtal; the Eastern or upper portion of the Hawulbaugh land (Almorah); the upper portion of Captain Ramsay's Plantation (old lines Almorah); certain portions of the Paoric land already described in these pages; in front of the Overseer's house Kaoligir (Deyrah Dhoon); nearly the whole of the Holta lands near Kangra.

A careful examination of any of these places will enable any one possessed of agricultural or horticultural knowledge to make similar selections. Such lands in a waste state are abundant in the Himalayas, and I believe that the same kind of land in cultivation can be had from the natives on very easy terms. In many instances it would probably be cheaper to buy land from the Zemindars than to clear it.

In taking large grants of hill land, the whole will rarely be found suitable for Tea cultivation. In this case those portions only should be cleared and planted where the soil is of such a nature as I have pointed out. See Remarks on the Bhurtpoor and Kutyoore Lands.

2. This, as I have already pointed out, is a very important part of the business, and requires to be carefully studied.

On plucking the leaves. Every vegetable physiologist knows that it is easy to render a plant unhealthy, or to destroy it altogether by continually depriving it of its leaves.* In my former Report I directed attention to the bad system of taking too many leaves from very *young plants*, and stated that, for the first two or three years, the leading shoots only should be topped, in order to *form* the plants and make them *bushy*. This has been adopted in the Government Plantations, and the good effects are apparent.

But it is also necessary to bring the laws of vegetable physiology to bear upon plants which are fully grown. If too many leaves are annually taken from them, they will soon become sickly, stunted in appearance, and covered with dead branches. And thus the method adopted in order to obtain a large return, although apparently successful for a year or two, will in the end defeat itself.

Overseers ought to make themselves well acquainted with the natural law which I have pointed out, and having understood it themselves they will be able to bring it to bear upon their Plantations. The native Tea-gatherers must be carefully looked after and instructed in this

* Overseers and Tea Planters ought to study carefully the "Theory of Horticulture," a work of Professor Lindley.

branch of the business. In China every child seems to possess intuitively the knowledge necessary to enable it to pluck leaves in the right way, and hence in that country the proper leaves only are taken, and the plants are rarely injured by over-plucking. The object the Chinese have in view is to obtain as large a quantity of leaves as the bushes are capable of yielding, not in any given year, but during the period of their existence; and although not vegetable physiologists, no one knows better than the Chinese that the way to accomplish this is by allowing the bushes to become fully developed, and to keep them in high health and vigour.

The natives of India, at present, seem to have no idea of the importance of this principle, and consequently they do much harm to the bushes by over-plucking and by plucking in the wrong way. Instead of nipping off the upper part of the young shoot with its leaves, as the Chinese do, they strip the leaves from it and leave the bare stems. These bare stems generally die down to the nearest leaves, and then the plants get covered with dead stems and present a sickly appearance. Besides the injury this system inflicts on the plants *a great loss is sustained at the same time*. About an inch and a half, and some times more, of the top of the young shoots is soft and succulent, and makes just as good Tea as the leaves themselves. The Chinese know this well, and hence they always nip off this portion with the leaves. The natives of India have no idea of it, and they leave it to die upon the bush.

In India large quantities of *old tough leaves* are also stripped from the bushes at each gathering. It is these leaves which form that coarse kind of Tea called "Bohea" at the Government Sales—a Tea totally unsuited for the foreign markets; and even the prices paid for it at the present time in India will not cover the expense of labor and packing. But although these leaves are worthless in Tea-making, they are invaluable to the health of the plants if left upon them, and therefore as few ought to be plucked as is possible. I have no doubt the time will soon come when the principal test of a good Overseer and a flourishing Plantation will be the small quantity of this so-called "Bohea."

As it may take some time to make the natives of this country understand the theory of Tea-gathering, I may suggest a very simple mode to make them practise it. The Chinese manufacturers sent round by me at various times,—some of whom are located on each of the Plantations,—ought to be ordered to go out from time to time, say at the commence-

ment of each plucking, and in the presence of the Overseer instruct the natives *practically* in the art. It will then be the duty of the Overseer to see that these instructions are duly carried out. The Chinese manufacturers understand this matter thoroughly, and it is one of very great importance to the future welfare of the Plantations.

3. The Teas manufactured formerly in these Provinces, and sent to England for the opinion of properly qualified persons, although valued highly, had a peculiar flavour, resembling those known as Ankoy kinds in China. On Chinese manufacturers, implements, and plants. It was considered a matter of some importance to remedy this if possible, and thus render the Himalayan Teas equal to the best Chinese kinds. The Ankoy Districts of China are near the Sea Coast and more accessible than those where the finest Teas of commerce are produced, and it was from the Ankoy Plantations Messrs. Gordon and Gutzlaff obtained their supplies of seeds, with which the original Nurseries in the Himalay as were first stocked. The earlier Tea manufacturers were also natives of the Canton Province, which does not produce the finest Tea. The question, therefore, which had to be solved was this—Was the objectionable Ankoy flavour owing to the peculiar variety of the plant, or to the method of manipulation? No one could tell; but it seemed extremely probable that it was owing to either of these causes, or perhaps to a combination of both.

I have been able to place means in the hands of Dr. Jameson to settle this point, and to improve greatly the appearance and flavour of Himalayan Tea. During my last visit to China, I succeeded in engaging the services of eight men from the best black Tea Districts of the Province of Fokien Districts, which in former days supplied all the finest Teas imported to Europe by the Hon'ble East India Company. Nine men were also engaged from the Ningchow District in Kiangse Province, where the finest black Teas are made at the present day. Besides these, I have also introduced four scented Tea makers and two lead-box makers from Canton. On a former occasion I sent round eight green Tea manufacturers,—natives of Hwaychow—a District which produces the finest green Teas exported from China.

These men are now actively employed on the Government Plantations in the Himalayas, each set making Tea in its own peculiar manner, and already a very great improvement has taken place in the *appearance* of Himalayan Tea. Whether the Teas made by them will be found free

from the objectionable Ankoy flavour remains still to be proved. But this point will be decided in a few months, when samples of this season's produce reach England.

Since 1848, when I first went to China in the service of Government, large quantities of the best kinds of implements, in use in the Districts already named, have been imported for the use of the manufacturers and for models for imitation in this country.

Many thousands of Tea plants have also been introduced from these Districts, and to these I beg to draw especial notice, and to place on record the following remarks.

They have been carefully treated and propagated extensively on the various Plantations by Dr. Jameson; but it is to be greatly feared that, in the changes which take place from time to time in Overseers, &c., they will become mixed up and confused with the original plants. I therefore suggest the propriety of taking effectual measures to prevent the possibility of this taking place, whatever changes may occur amongst Overseers or other workmen.

It is just possible that the faults found by the London Brokers with Himalayan Teas may be remedied by the new and superior method of manipulation; but if the cause of this lies in the constitution of the original variety of the plant, then those obtained in the best Districts of China will prove of very great value. All the plants from the black Tea Districts ought, therefore, to be kept together, and marked so that no mistake can by any possibility occur, and the same thing ought to be done with the plants from the green Tea Districts, making particularly those from Hwaychow. The different Districts were carefully marked in the lists sent from China by me with the plants and seeds.

I attach great importance to this being carefully attended to until the matter in question is finally settled. Any opinion formed or expressed at present is necessarily premature and of no value whatever.

4. The experiment of Tea cultivation in these Provinces having proved successful in the hands of Government, a number of private persons have commenced its cultivation. The success of these individuals will depend chiefly upon two things,—namely, the amount of knowledge they bring to bear upon the subject on the selection of land and general management and the capital at their command. Tea cultivation to be profitable must be carried on extensively, and to

Tea cultivation in the Himalaya viewed as an investment for English capital.

do this, a large amount of money must be available. It is true that a man with small capital, and having the requisite amount of knowledge—if content with a moderate, or even handsome and certain remuneration for his outlay and labor—might succeed and gain a comfortable living by the cultivation of Tea on the Himalayas. But if such an one expects to make a rapid fortune in this way, I fear he may be disappointed in the end. And then it is to be feared that, in many instances, the Teas produced on such farms would not be properly manufactured, and, if either sold in India or exported to Europe, would give the Himalayan Teas a bad name, which they would be years in getting rid of.

It appears to me that Government, having brought the matter to such a satisfactory state, ought to guard against failures of this nature. A large public Company, got up by men of unblemished reputation and possessing sufficient capital, is much more likely, in my opinion, to succeed, than detached small capitalists. I have no doubt that by avoiding the errors formerly committed in Assam, and by taking care that proper Officers are appointed to manage its affairs, such a Company would find Tea cultivation in these Provinces highly remunerative. In this case Government might hand over all the present Plantations, buildings, and implements at a valuation, and at the same time make certain proper and stringent stipulations regarding the Tea manufacturers, who would also be invaluable and indispensable to such a Company; or two such Companies might be formed,—one for the North-West Provinces, and another for the Punjab.

I would strongly advise Government not only to discourage, but to take measures to prevent, mere adventurers from getting up a Company of this kind,—men who have no other object in view than power and place, and who would probably in the end bring ruin upon the shareholders, and give a check to Tea cultivation in these Provinces, which it would take many years to recover.

5. If Government should be of opinion that the time has not yet
 Concluding remarks. come for parting with the experimental farms, it will be necessary immediately to increase the size of the factories and godowns, particularly at Holta and Kaoligir. At Holta, if the advice I have given regarding the gathering of leaves is attended to, the produce will be very great in two or three years, and the present premises will be found far too small for the purpose of manipula-

ting the leaves. And if the whole of the 400 acres at Kaoligir are brought into high cultivation, it will also yield far more leaves than can be properly made in the present factory. The number of Tea makers, implements, &c., will also have to be greatly increased at both of these places.

When I visited these Provinces in 1851, I had some hopes that the Zemindars would speedily take to the cultivation of Tea on their farms, and that the Hill sides would soon be dotted over with small Plantations, such as one meets with in the Tea Districts of China. These hopes, I regret to say, have not yet been realized. There seems to be a deeply-rooted prejudice against the innovation which it may still take some years to overcome. One man, in particular, has acted in such an extraordinary and unaccountable manner, that I cannot help noticing the circumstances in this Report.

About 36 miles North West from Almorah, in the Kutywar District, there are two Plantations, covering, together, about 8 acres, which were formed by Captain Ramsay seven or eight years ago. I visited these in 1851, and they were very favorably noticed in the Report sent to Government at that time. Since then they have been handed over, or rather presented, to a Zemindar, with certain peculiar advantages, in order to encourage him to carry on the cultivation on his own account. A Government factory was within 3 miles of his farm, where the leaves were taken from him at the rate of 8 Rupees a maund. He had, therefore, only the trouble of keeping the land free from weeds, of gathering his leaves, and of bringing home the money received for them.

The circumstances in which this man was placed were altogether most favorable. Supposing the land to have been yielding annually 800lbs. of raw leaves per acre, which is a very low average, he would have been realizing Rupees 80 an acre for his land, or Rupees 640 for the 8 acres under Tea—a sum I should imagine twice as large as he would make from any other crop and with less trouble.

When I visited this (once) fine Plantation a few weeks since, I found it utterly neglected and all but ruined. Although, in my former Report, I pointed out most plainly, and in strong language, the folly of irrigation, or of attempting to cultivate Tea on marshy lands, this man had converted his Plantation into a marsh, and was flooding it with water from Rice fields situated on a higher level than the Tea Plantations. In some places I observed he was cultivating Rice amongst the Tea! Two years more of such treatment, and not one plant will be alive. Already the

poor man is beginning to complain that the plants are not yielding large crops of young leaves, and he is gathering the old ones in order to make up the difference.

Captain Ramsay has another Plantation on the old Sepoy Lines near Hawulbaugh. This is at present in most excellent condition and is most promising. If managed in a proper manner, it will be very valuable in a year or two. All that it requires at present is—*first*, to be kept clear; *secondly*, the plants formed by topping the leading shoots in order to make them bushy; and, *thirdly*, good drains made and kept open to carry off the springs, which in some places ooze from the Hill side. In two years more it will yield a large crop of leaves, and will go on yielding for many years.

Although Tea cultivation amongst the Zemindars has not made much progress up to the present time, yet it is by no means to be regarded as hopeless. In all countries, it is difficult to induce the inhabitants to make any change in articles of cultivation, and the more ignorant they are, the more averse are they to any innovation. Even in England, in which there is perhaps less of this feeling now than in most other countries, every one can call to mind instances in which great improvements in agriculture were long retarded, owing to the ignorance and prejudice of the people.

But although the introduction of Tea cultivation amongst the Zemindars may be slow at first, yet, in the end, it is almost certain to be adopted. And when once the prejudices which now exist against it have passed away, when a few have felt the advantage which such a crop is certain to confer upon them, others will speedily follow in their footsteps and, as in China, every village amongst these Hills will furnish its portion of Tea, the coarse kinds of which the natives will consume themselves and the rest will be sold to merchants for consumption in the plains, or for exportation.

The large amount of foreign capital, which will necessarily be brought into these Provinces to carry on Tea cultivation on an extensive scale, will be of very great importance to the people, and this alone is well worth the attention which Government has bestowed upon it. But although the resources of the country will thus be largely developed, and a great demand for labour established, these benefits will be slight when compared with those which would be conferred upon the inhabitants, could they be induced to cultivate and produce the article themselves. They would not only have, for their use, a simple and healthy beverage to drink

but it would also furnish them with the means of procuring a few of those harmless luxuries, which would have a tendency to raise their character, and to make them, as a people, more intelligent and industrious.

At present, as a general rule, the natives of these Hills are lazy and indolent, and seem perfectly satisfied with a bare substance—indeed they can scarcely be said to enjoy the common necessities of life. Their clothing is miserable in the extreme, and their dwellings would scarcely be considered fit for the lower kinds of animals, I will not say in England, but even in a half civilized country like China. If a change in the habits of the people could be brought about by the cultivation of Tea, such a famine as that which was felt in Kumaon and Gurhwal this year is not likely to occur. But if a people are so indolent as to allow their lands to lie waste, or only half tilled—if they are content with their daily bread and make no provision for the future—a dry season such as the last may occur at any time when the crops fail and a famine is the result. Such a state of things could never take place in China, at least from such a slight cause, because the Chinese feel that the necessities and luxuries of life are indispensable to their happiness, and they are industrious in order to supply them.

Another great advantage of Tea cultivation for the Hill farmers is this; it would never fail to yield a crop, even in the driest seasons. Last Spring I had an opportunity of seeing all the Government Plantations in the dry weather, and, when nearly every other crop had failed, the Tea seemed uninjured. This is a fact of very great importance, and shows that, with proper management, there is scarcely a chance of failure even in the driest year.

The poor in India are never likely to enjoy this healthy and refreshing beverage, until they can produce it themselves on their own lands, for the price will be higher than they can afford to pay.

It is for these reasons I estimate so highly the importance of Tea cultivation amongst the Zemindars in the Himalayas. I am quite sure that, notwithstanding the prejudices which exist in their minds against it at present, if the influential Officers of Government as a body were to encourage its cultivation, these prejudices would rapidly disappear. And when they have passed away,—when small Tea Plantations are seen dotted on every Hill side as in China—when the natives are met on the roads in large numbers carrying the produce of their little farms to the market towns, or to the factories of foreigners for sale,—a boon will have been conferred upon them of inestimable value.

APPENDIX TO THE ABOVE REPORT.

FROM

R. FORTUNE, ESQUIRE,

TO

C. B. THORNHILL, ESQUIRE,

Officiating Secretary to Government, N. W. P.

Dated October 25, 1856.

SIR,

WITH reference to the Memorandum on Tea Cultivation, presented to me at Nynee Tal by orders of the Hon'ble the Lieutenant-Governor, I have the honor to enclose an Estimate of the supposed expenditure and income on a Tea Plantation of 1,800 acres spread over a period of eight years.

2. I have given the sum of Rupees 2,00,000 as the amount of capital available for the purpose. It will be readily observed, on referring to the enclosed Table, that a sum equal to half that amount would not be proportionably productive. Many of the items such, for example, as those for buildings, implements, Chinese manufacturers, Overseers, &c., would amount to nearly the same sum on a small Plantation as on a large one.

3. For the same reason, a larger amount of capital, say £100,000, would be proportionably more profitable than £20,000. A great Company of this kind would be able to command the services of first-rate men to superintend its operations, and to import manufacturers and implements from China. The Government Plantations would, no doubt, supply a number of native workmen who have been taught by the Chinese at present on the different factories; but if Teas of a superior class are required a few Chinese manufacturers will always be necessary,—at least for a number of years.

4. From the eighth to the tenth year, the maximum return would be obtained from the land, and with proper management, but little diminution would take place for ten or fifteen years more. I have no doubt that, with good land and judicious cultivation, 300 lbs. per acre might be obtained during many of those years, and if the Manager understood his business, he would be yearly extending his Plantations, so that, at a given time would the whole be worn out.

5. I have only to remark further that these cultivations are based upon the supposition, as put before me in the Memorandum, namely, that the speculator "possessed of a complete knowledge of the mode of managing the Plantations and conducting the operations of the Tea factory." I have already given full information upon this subject in the body of my Report, and from the means I have had acquiring such knowledge in the Tea countries of China, it may be fully relied upon.

I have the honor to be,

SIR,

Your obedient Servant,

R. FORTUNE.

Rough Sketch of the Quantity of Land which could be brought under Tea Cultivation, with a Capital of Rupees 2,00,000, and also intended to show the probable amount of Expenditure and Profits spread over a space of six and eight years.

1,800 ACRES OF LAND.

Expenditure from the 1st to the 6th year inclusive.		Income from the 3rd to the 8th year inclusive.	
	Rupees		Rupees
Factory and houses for Tea makers	6,000	Tea manufactured in the 3rd year, say 10 lbs. per acre, at 8 as. per lb. }	9,000
Bungalow for Overseer	1,400	ditto in the 4th year " 30 lbs. " at ditto..	27,000
Pay of Overseer, at 100 Rupees per month, for 6 years	7,200	ditto in the 5th year " 80 lbs. " at ditto..	72,000
Pay of 500 men, at 4 Rupees per month, for 6 years	1,44,000	ditto in the 6th year " 120 lbs. " at ditto..	1,08,000
Ditto of 10 Chowdries, at 8 Rupees per month, for 6 years	5,760	ditto in the 7th year " 150 lbs. " at ditto..	1,35,000
Ditto of 1 Moonshee, at 12 Rupees per month, and 2 Chupprassies, at 5 Rupees per month, for 6 years	1,584	ditto in the 8th year " 200 lbs. " at ditto..	1,80,000
Rent of Land for 6 years, at 1,350 Rupees per annum	8,100	Total in the 8th year	5,31,000
Expense of preparing Tea, in 3rd, 4th, 5th and 6th years, say 20 men, at 5 Rupees per month	4,800	Deduct amount supposed to be expended in 8 years	2,68,612
Four Chinese Tea manufacturers, at 34 Rupees per month, for 4 years	6,528	* Profits,..	Rupees 2,62,388
Implementa, passage money for manufacturers, carriage, &c., say 4 years	8,628		
Contingencies for 6 years, say 1,000 Rupees per annum..	6,000		
	Rupees 2,00,000		

* There would be sundry expenses deducted from this sum, such, for example, as interest of capital for the first 6 years, auctioneers' fees, carriage, &c., if the Teas were sold in India; and carriage, freight, and other shipping charges if exported to Europe and America, or the Colonies. I have put down the pay of the Overseer at Rupees 100 per mensem, as that is the sum at present paid by Government; but it would probably be necessary to raise that to Rupees 300 if a good man could be procured. I have supposed the whole of the 1,800 acres to be planted in one year; but this would probably be impossible, as it would take some time to select the land, and the requisite number of plants might not be procurable at once. In this case, however, the expense for labor would be proportionably less.

Working Expenses in the 7th and 8th year.

Overseer's pay for 2 years	2,400
500 men for ditto	48,000
10 Chowdries for ditto	1,920
1 Moonshee and 2 Chupprassies for ditto	528
Rent of Land for ditto	2,700
Expense of preparing Tea doubled, say	4,800
Wages of 4 Chinese for 2 years	3,264
Contingencies for wear and tear of implements, boxes, &c., in 2 years	5,000
	Rupees 68,612
Total ..	Rupees 2,68,612

R. FORTUNE.

Letter from the Superintendent Botanical Gardens, North-Western Provinces, to the Government, North-Western Provinces, dated 17th November 1856.

I HAVE the honor to acknowledge the receipt of your letter, No. 1573 A., dated 17th Ultimo, enclosing Mr. Fortune's Report "upon the present condition and future prospects of Tea Cultivation in the North-Western Provinces and in the Punjab." I gladly avail myself of the permission granted to me, in your letter, by the Honorable the Lieutenant-Governor, to give the necessary explanations. But before entering into details, I may at once state that every suggestion made in the Report for improving the Plantation has already been carried out, and many of them for years. I trust, however, that the remarks I am about to offer will not be considered as cavilling at the information tendered; but in justice to myself as Superintendent of one of the most important experiments ever tried in this country—an experiment in which I have ever taken the most lively interest and carried on to the best of my ability, being thoroughly convinced that it will ultimately become of vast importance to the commercial welfare of the Kohistan of the North-West Provinces and Punjab.

In this work I have now been engaged for many years, and though the results shown are not very great, yet still they are satisfactory, and had the experiment received years ago from Government the same countenance and support that it now does, Teas might have, ere this, become a staple article of exportation from Upper India, and have been the means of giving profitable employment, and thus subsistence, to thousands of poor people. In the Report under consideration, a series of suggestions have been made for the benefit of the Overseers and Tea cultivators generally, not one of which is original; and had such suggestions been at all called for, they would have proved that I, as Superintendent, had been highly negligent of the duties entrusted to my charge.

Some years ago, for the benefit of cultivators, I compiled a few brief notes on Tea Cultivation, with brief remarks on selecting and preparing land, sowing seeds, transplanting young plants, and plucking leaves, &c., which were translated into Oordoo and Deva Nagree, and extensively distributed, particularly in the Kangra Valley. Copies, too, were given to each of the Overseers, and in every inspection made by me, I have always ascertained that the general modes for carrying on the Plantations, as inculcated by me in these notes, have been strictly carried out. But as these notes point out much more distinctly, and at the same time include all the information contained in Mr. Fortune's suggestions, I beg to insert them here.

I.—"Ground fitted for Tea Plantations.

"In selecting ground for Tea Plantations, care must be taken to chose only well-drained land, not dry, stiff clayey land, in which nothing will grow, but land rather moist, in which the soil is light or free. All low places, where rain water rests, must be avoided, such as the lowest part of valleys, &c.

1. "In the Kangra Valley, which consists of a series of small hills, and undulating and highly inclined plains, and in Kulloo, the slopes of the small hills

"and mountains are admirably adapted for this kind of cultivation, and it matters not how great the dip of the hill side is, provided that the soil is not liable to be washed away; well drained land, such as terraced lands, is also well adapted for Tea cultivation.

2. "With dry crops, such as wheat, barley, chunnah, mundooa, &c., Tea cultivation can be most conveniently mixed. But on no account ought Tea plants to be planted where irrigated Rice is grown, as the water would destroy them. The richer the land, the quicker will the growth of the plant be.

3. "In the Kangra Valley at Holta, the soil is silico-aluminous, mixed with a considerable proportion of vegetable matter, and resting on a sub-soil of yellowish clay abounding with boulders which admit of good drainage, as they act like pipes. This kind of soil, which prevails throughout the Kangra Valley, is well fitted for Tea cultivation.

4. "The Kulloo land selected for Tea cultivation ought not to exceed 5,500 feet in altitude. The best limit is from 3,000 to 5,000 feet."

II.—"On the method of preparing ground.

5. "Before sowing Tea seeds let the land be well ploughed or trenched with the phaoorah to the depth of 18 or 24 inches, and all the weeds removed; and let it be well manured to the extent of 60 to 70 maunds per acre if manure be plentiful. If not, a much smaller quantity will do. Let it then be smoothed and thrown into beds, it will then be ready for seeds and plants."

III.—"On the method of sowing seeds and season, and on the treatment of the young plants.

6. "On the seeds being removed from their capsules, sow them to a depth of one inch, and very close, in drills 8 to 10 inches apart from each other, in order to give the seedlings room to grow, and enable the cultivator to remove easily the plants from the beds when he commences to transplant. Water them sparingly, which need not be again repeated until the seedlings begin to show themselves above ground, after which time let them be watered every six or seven days.

7. "As Tea seeds will not germinate if kept long out of the ground, they ought to be sown as soon after they are ripe as possible, and they ripen in October. All the sowings should be finished during that month, or in November. If they are sown in December and January, not more than 20 per cent will germinate. This ought to be particularly attended to. All the seeds sent to Hazara last season were not sown until April, and the result was, only five germinated. Government have imported large quantities of seeds from China, but not one of them has germinated. I mention these facts to impress on the mind of the cultivator the necessity of early sowing. In April, when the sun's rays become very powerful, and the weather very hot and dry, the seedling beds should be covered with grass tatties, and these ought to be kept on until the rains set in. By doing this the plants grow much more luxuriantly. The height of the sticks on which the tatties

"rest ought to be about 5 feet, which will allow the air to circulate freely, and the sun's rays to penetrate the beds in the morning and afternoon.

8. "To remove the tatties occasionally in the afternoon, and allow them to remain off until 8 A. M. the following morning, will be attended with much advantage.

9. "The seed beds ought to be weeded three or four times during the season, and the first weeding ought to take place as soon as the young plants begin to appear. The cultivator may be then afraid to weed them lest he destroy some of the seedlings; but though he may do so, the advantage gained by loosing the soil freely more than compensates for any loss."

IV.—"Method of transplanting and season.

10. "As soon as the seedling plants are 8 inches in height, they are fit for transplanting, and in doing so they ought to be planted $4\frac{1}{2}$ feet apart. Let holes be dug to the depth of 1 $\frac{1}{2}$ feet or more if necessary, as the Tea plant bears a very long tap root, and great care must be taken not to cut or injure it, as if it is cut, it will kill the plant or render it sickly. In lifting, therefore, the plants to be transplanted, the ground ought to be well opened up, and if possible each plant lifted with a small ball of earth attached to the roots. If two or three plants adhere to each other, then they ought all to be taken up and put into one and the same hole. Let the earth be then well pressed down with the foot at the roots, and watered. If manure be available, a small quantity ought to be put into each hole. For watering, the common country ghurrahs are well fitted."

V.—"Season.

11. "As soon as the rains have set in, transplanting ought to commence, and be continued throughout the rainy season. In the Kohistan of the Punjab heavy rains occur during the months of December, January and February. These months, therefore, ought to be taken advantage of, and transplanting carried on. But it is not to be continued later than February, as dry and hot weather prevails during the latter end of March and April. On no account, if the rains fail and the weather be hot and dry, should transplanting be carried on."

VI.—"Method of plucking and gathering leaves.

12. "The season for gathering leaves commences in April and continues until October. But leaves ought not to be pulled until the plants are three years old, as if done earlier, the bushes are injured and become stunted and sickly. In making Teas, only the fresh and young leaves are used. When, therefore, the plants throw out young leaves in April (the old leaves being hard and useless) the first crop is ready for gathering. Each of the gatherers ought to be provided with a small basket, into which he throws the leaves as soon as they are collected. Having filled this basket, the gatherer empties it into a large one, in which the leaves are conveyed to the factory, which must be done as soon after they are gathered as possible. On bringing the leaves to the factory they will be weighed

by the Overseer in presence of the cultivator, and purchased at the rate of 8 Rupees per pukka maund. During the season four gatherings may be taken from the same plant. After the 1st of October the plucking of leaves must be discontinued, as they become too hard, and therefore unfitted to make good Teas. Moreover, it is necessary to give the plants time to recover.

13. "I have stated that plants ought not to be plucked until they are three years old. In the second year, when the leading branches grow rapidly and thus tend to form scraggy bushes, the terminal shoots ought to be pinched off to induce the plant to take a basket or bushy form, and this must be done two or three times during the season. No object is gained by allowing the bushes to grow higher than 3 or $3\frac{1}{2}$ feet, as children and young persons are thus prevented from being employed in plucking leaves if they are higher. The cultivator ought, therefore, always to check their upward growth, when the bushes have attained this height, by pinching off the leading shoots, and thus induce the plant to increase in breadth.

"14. I have stated that the first crop of leaves is gathered in April. The second crop is generally gathered as soon as the rains commence. The number of crops depends entirely on the season. I have given four as the maximum, but as all the bushes do not come into crop at one and the same time, the number of gatherings may be increased to eight, one-half of the Plantation only being taken at a time. No individual bush, however, ought to be plucked more than four times during the season. On the 1st October the season for gathering leaves is finished, as they have now become hard and brittle and do not curl, and are thus unfitted for Tea-making. But the seeds are now ripe, and the cultivator ought now to pull and husk them, prepare his beds, and at once commence sowing. On this being finished, the Plantation ought to be trenched, all the weeds removed, and a little manure given to each plant. During the year the Plantation ought to be weeded three or four times, and the weeds carefully collected in heaps and allowed to rot, and as soon as decomposed, put at the roots of the plants. The grass too growing in the Plantation should be carefully collected and given to the cattle as fodder and bedding, and thus a considerable quantity of manure may be secured. By using the grass as bedding the liquid manure will in a manner be saved.

"15. To Zemindars desirous of undertaking Tea cultivation, plants and seeds in any number and quantity will be issued from the Government Plantations at Hawulbaugh, Bheemtah in Kumaon, and at Boru in Gurhwal. All Tea leaves brought to the factories in good order will be purchased at the rate of 8 Rupees per maund, and to the first party who brings leaves the following rewards will be given—

"The first party who brings pukka 100 maunds of good fresh leaves will receive Rupees 300. The first party who brings 50 maunds, Rupees 100. The first party who brings 25 maunds, Rupees 50. The first five parties who bring 12 maunds, Rupees 30 each. The first ten parties who bring 10 maunds, Rupees 20 each. Each party must show that the leaves brought have been gathered from different Plantations.

"I may add that in a Report sent by me to Mr. Secretary Thornton in August 1847, I have there given more minute details in reference to the management of a Tea farm. This Report has been published in the *Journal of the Agricultural Society of Calcutta*."*

True it is that several of the Overseers belonging to the Plantations have little or no experience,—men who formerly belonged or still belong to the ranks of the Army; and as I cannot be present everywhere over a tract of some twelve hundred miles, in which the different Plantations are located, mistakes in planting and gathering leaves do occasionally occur. But, I think, with the raw materials I possess, much has been done. All the suggestions made by Mr. Fortune are no novelties to us. Thus, his remarks for selecting and preparing land have been carried out for years. Leaves have been gathered on the principle suggested by him since the Plantations were formed, but with several important modifications. With raw coolies, however, (and when the first crops of leaves are being gathered,) a large number is always required to assist the establishment, as if the leaves are not gathered rapidly they soon become hard and brittle and thus useless for making Teas. It is an exceedingly difficult matter to confine their attention to the gathering of certain kind of leaves.

Moreover, in every Plantation, when leaves are collected, a certain quantity of coarse and semi-hard leaf must always be gathered. In China Mr. Fortune leads us by his Report to infer that coarse kinds of Teas were unknown. On the seaboard towns this is no doubt the case, as they have no sale and are unfitted for the Home Markets; but Mr. Fortune, according to his own statement, never visited a black Tea factory, and never saw black Tea made in China. When, at my suggestion, he was sent a second time to China, I directed his attention particularly to the subject of coarse Teas; but owing to the disturbed state of the country he could not with safety proceed any distance into the interior, and therefore had no opportunity of inspecting any black Teas after preparation, and before they were sifted, and what knowledge he now possesses on the subject of black Tea making has been obtained from his visit to the Government factories in the North-West Provinces and Punjab. Any one visiting China and confining his observations to the Ware-houses of Merchants, would find only the finer kinds of Teas, as there none else are received by them, as they are quite unfitted for the European markets. By the Honorable the Court of Directors orders have been sent that no more Teas of the coarse description be sent home, as there is no demand for them, the duty being so high. But that Mr. Fortune might make himself thoroughly acquainted with all the different processes of black Tea manipulation,—from the gathering of the leaf, to the firing, preparing and packing of Teas, including the winnowing, sifting, packing, &c., and thus be enabled to communicate the result of his observations,—was one of my chief reasons for recommending his second deputation; and when in China I pointed out to him how valuable it would be for us to ascertain the proportion of second class Teas to fine Teas yielded by a certain quantity of fine leaf. That a considerable quantity of coarse Teas are annually made in China, is a well-known fact, though they are never brought

* See Vol. VI. Part II of *Journal of the Agricultural and Horticultural Society of India*.

to the seaboard towns for the reasons already stated. They, however, form a vast and important trade with Central Asia and Russia, and all the black Teas, samples of which find their way to the British Provinces from Thibet by the Meete, Cuntadoura, and other Passes, in the Himalayas, are nothing but Bohea Teas, but far inferior to the second class Teas prepared in the Government factories. Owing to their cheapness, our second class or Bohea Teas are eagerly sought for by the native merchants of Almora and Nynce Tal, in order to retail or barter with the Bhoteas, and though they do not fetch such a high price as the finer kinds of Teas, yet still it is a remunerating one and one too which the second and lower class of natives can afford to give. But it has ever been my most anxious endeavour to reduce, as much as possible, the preparation of this kind of Tea. To bring this about I urged on Government the necessity of having more Chinese Tea-makers imported, and this season twenty-three new Chinese Tea manufacturers have been received, and I am confident that the proportion of coarse Teas to fine Teas will be greatly decreased. Last year the proportion of second class Teas to fine Teas was greatest in the Kangra factory, and this was entirely owing to the want of able workmen, there only being two Chinese attached to the factory there. This year the number has been increased, and with most beneficial results, nor ought it to be wondered at as at all extraordinary that the second class Teas exceeded the first class in that factory, the proportion being *viz.* lbs. 1,799 of fine Teas to lbs. 3,278 of the second class, or coarse Teas, when it is remembered for how short a time Tea making has been introduced into the Kangra Valley. But even Mr. Fortune himself, though he says that many old leaves are taken off the bushes in our Plantations, admits that in China coarse Teas are also produced and consumed by the natives. Thus, in his Report he says—"And when once the prejudices which now exist against it (Tea cultivation) have passed away, when a few have felt the advantages which such a crop is certain to confer upon them, others will follow in their footsteps, and, as in China every village amongst those hills will furnish its portion of Tea, the coarse kinds of which the natives will consume themselves, and the rest will be sold for consumption in the plains or for exportation."

For several years the coarse kinds, or Bohea Teas, prepared in the different factories, have principally been purchased by natives. But I may here remark that those coarse Teas are never prepared alone, but at the same time as the fine Teas, and are obtained by sifting, winnowing and hand-picking, the plan adopted to separate the different kinds of Teas from each other. These coarse Teas are eagerly sought for by the Bhoteas on the British frontier and of Thibet, and a highly interesting trade is now taking its rise, which will ultimately become very important, as the Bhoteas readily barter the produce of their country for our Teas; and if the Chinese do not prohibit them from being sent across the Himalayan Passes, in a few years nothing but Kumaon Teas will be met with in Thibet to the exclusion of the black Tea now extensively used here, and thus we shall see India supplying at a cheap rate a portion of the Chinese Empire with one of its principal staples of produce.

By the proposed new road opened up, a strong impetus will be given to this trade. But to prevent these coarse Teas being prepared to any extent, Mr. Fortune

recommends a plan to be pursued in gathering the fresh leaves, *viz.*, to order the Chinese Tea makers themselves to superintend the gathering of leaves. Had Mr. Fortune, when he visited the Plantations, asked any of the Overseers the plan pursued in gathering leaves, he would have been told that the Chinese, when not employed in the factories, always superintended* the coolies, that the Plantations were divided into so many divisions, that to each division were allotted so many men to gather the leaves, that over each body of gatherers there was a Chowdry and one or more Chinese, and that the Overseer himself was constantly amongst them when not otherwise engaged. But though every endeavour is made by the Overseers, the Chinese and the Chowdries, to prevent any thing but young and fresh leaves being gathered, a certain proportion of old ones, as already stated, are always gathered, and through the inexperience of the gatherers the leaves from young bushes are sometimes taken, and thus the bushes are frequently injured. But this is one of the evils that must ever attend the introduction of such an article as Tea. That the plucking of leaves has been carried to such an extent as to injure seriously the bushes in many of the Plantations in Kumaon and Gurhwal, is, in my opinion, a mistake. Mr. Fortune alludes particularly to the Plantation of Pooree. When, however, it is considered that for three consecutive seasons the cold weather rains have entirely failed; that owing to the general drought throughout the hills all serial crops have failed; that grain was selling at famine prices; that, owing to the great scarcity all pilgrims were this season prohibited from entering the hills and visiting the holy shrines; and that famine itself was only staved off by the active and energetic exertions of the Civil authorities in importing grain from the plains: considering all these things, we need not, I think, be astonished at portions of the Plantations not looking so flourishing as they ought, and seek for an explanation in the impoverished soil and over-plucked bushes. Moreover, the establishment in this Plantation was much too small for the quantity of land under cultivation: this, however, for some time, has been remedied, the Honorable the Lieutenant-Governor having granted an increase.

In strong and well-manured land, Tea bushes throw out long terminal branches, which, if not topped or nipped off with the thumb and forefinger, form scraggy bushes—bushes which give few leaves, as all the strength is exhausted in forming wood. The new black Tea makers requested that from an inch to an inch and a half of these shoots should be nipped off along with the two upper leaves. This was done, and has been carried on throughout the season by the parties collecting leaves for these men. The green Tea makers, on the other hand, condemn these shoots, as they are not fitted for making green Tea, and the parties that collected leaves for them were ordered only to collect the leaves and leave the shoots. The new black Tea maker's impression was that by mixing such portions of the young shoot or stem with the leaves the aroma and strength of the Teas were improved.

* At Deyrah Kaoligir, and in Kumaon at Hawalbaugh, Mr. Fortune saw the Chinese superintending the native Tea leaf-gatherers.

With reference to the Deyrah Plantation, when Mr. Fortune visited it in May 1851, it had been greatly damaged by a tremendous hailstorm, which had bruised and cut the bushes to pieces. This storm took place twenty days before the Plantation was inspected, and thus caused a vast number of the bushes to look sickly and unhealthy. This I explained; but the reason assigned for the condition of the plants was not considered satisfactory, and he sought for other causes to explain their condition. These were, to use his own words,—1st., "the Plantation being formed on flat land; 2nd., system of irrigation; 3rd., too early plucking; and 4th., hot dry winds which are not unfrequent in this valley from April to the beginning of June." Now, instead of admitting in his present Report that he had made an error in condemning the Deyrah Dhoon as a place fitted for Tea cultivation, and candidly stating that he had not made due allowances for the effects of the hailstorm, he accounts for the prosperity of the Tea Plantation by the change of the system of cultivation, and makes no allusion to the flat ground over-plucking, or the climate. That the system of cultivation has been changed is erroneous, and the Plantation owes its flourishing condition entirely to good cultivation, good manuring, and partial irrigation. With reference to irrigation, which has been so much noticed, it is of the greatest consequence to young plants when newly planted out, and when drought occurs. Even in China, when droughts occur, large tracts of Tea planted land in many districts are destroyed and require re-planting. In 1854 the supply of water from the Canal was stopped during the months of May and June, and thus nearly a million of young seedling plants were destroyed in the Kaoligir Plantation. In the adjoining Plantation of Hurbunswallah, consisting of 80 acres, which was visited by Mr. Fortune, all the young and newly planted plants are sparingly watered and were being irrigated when he visited it, and yet all the plants were growing vigorously and in the utmost health, and this Plantation is conducted on the system adopted by me. But to water plants when they have taken hold of the ground, unless during great drought, is quite unnecessary and an useless waste of labour. But as a rule, and one which I have strictly pursued for years, and which ought to be pursued in every locality where Tea is cultivated, transplanting of young plants ought to be confined to the rainy season, which renders irrigation entirely unnecessary, barring to the seed and seedling beds, which ought to be watered throughout the hot weather. Mr. Fortune states that the Kangra Plantations are the best under my superintendence and have never been irrigated. This is a mistake. All the seed and seedling beds have always been watered, and as the transplanting there is always carried on during the rainy weather, it is quite unnecessary. But even here he admits the value of irrigation in a season of drought. Thus he states that the Holta Plantation, which is abundantly supplied with streams of fine water, which flow from the mountains at all seasons of the year, and which are most useful in dry seasons like the last, when newly planted plants are apt to suffer from drought. But it is of the utmost importance to Tea planters to know that the Tea plant, if planted at the proper time, *viz.*, during the rainy season, does not require irrigation, as there are vast tracts of land in the Kohistan of the North-West Provinces and Punjab which, though they cannot be watered, yet still are admirably fitted for Tea cultivation, and in the Government Plantations

at Pooree, Ayar Toh, and Bhurtpoor, there are no means available for irrigation, and here—particularly at Pooree,—which is an old Plantation, several portions are yielding upwards of 300lbs of Tea per acre. Had Mr Fortune, been able to inform us how a China Plantation was conducted, the quantity of manure given per acre, value of manure, and the expense of laying it down, time of the year when plants were manured, quantity of raw leaves gathered per man per day, and the yield per acre from the first, second and third crops, proportion of the different kinds of Teas prepared, expense of Tea cultivation per acre,—all of which points in my letters to his address I brought prominently to his notice, and requested the necessary information,—his Report would have been highly valuable. But that this Plantation and that Plantation in the North West Provinces are considered by him equal to the finest Plantations that he saw in China is no doubt interesting; but information of this nature carries with it no value to the cultivator, though it may be of importance to the future capitalist.

China is no doubt the model country of Tea cultivation. But that the Kohistan of India may be made ere long to outstrip it, and turn out twice as much Tea per acre, by high and scientific cultivation, the latter referring to the application of proper manure, is probable. As yet, owing to the want of information regarding Chinese Plantations, we cannot compare the results already yielded by the Government Plantations. But with an out-turn of 300lbs of Tea per acre, which is the yield at present of the Hawulbaugh Plantation, and which, if sold at the low rate of 8 annas, would yield Rs. 150 per acre, and that too from land the rent of which demanded by Government is only 12 annas per acre per annum, most parties would be satisfied, and such definite results are more satisfactory to the public than that the Plantations look as well as those of China. But it is not large bushes that are required to give a great yield, and in general 3 feet to 4 feet ought to be the maximum height, as broad basket shaped bushes, such as most of those in the Hawulbaugh Plantation, yield many more and much better leaves than tall scraggy bushes. By the late Governor General, the Marquis of Dalhousie, the Deyrah Dhoon Plantation was inspected six months after Mr. Fortune had seen it, and his Lordship expressed himself highly gratified with its flourishing condition. This I communicated to the late Lieutenant-Governor, and was ordered by him to carry on operations as usual with vigour. But the Report of Mr. Fortune had a most damaging effect; it led those who were lukewarm in Tea cultivation to suppose that, as far as the Deyrah Dhoon was concerned, it was a failure, and therefore not worthy of attention. The Civil Authorities gave it little or no countenance; and the native community, seeing that it did not receive any attention from their Governor or Superintendent, neglected—and ultimately abandoned—what they had begun. Here, therefore, there was for a short time a retrogression. For these reasons, therefore, and knowing well that Mr. Fortune's opinion would have weight both with Government, the district authorities, capitalists and speculators, I solicited the Honorable the Lieutenant-Governor that, on his arrival in Calcutta from China, he might be again deputed to the North West Provinces and Punjab to report on the present condition of the Plantations, but more particularly that of Deyrah, being ever convinced in my own mind that the remarks made in his first Report regarding the Deyrah Dhoon being unfitted for Tea cultivation,

were erroneous. Now, in his present Report he writes—"I have great pleasure in stating that I have never seen finer or more productive Plantations in China;" and further—"The results have entirely removed any doubts I formerly had regarding the locality as suitable for Tea cultivation;" and then claims for himself the merit of it on the plea that he had recommended a certain kind of cultivation. True he states that the labour establishment has hitherto been much too small. But with such a Report as the first sent by him to Government, would it have been prudent on my part to have asked for additional labour when the locality had been condemned as unfitted for Tea cultivation? Had I done so before proving by uncontrovertible facts, *viz.*, the yield, that Mr. Fortune had made a mistake, it might have been supposed by Government that I was attempting, at great expense, to bolster up an experiment that would not succeed. I, therefore, as the Honorable the Lieutenant-Governor is well aware,* marked off a certain portion of the Plantation, and gave it high cultivation, and cultivated the remainder in the best way I could with the limited establishment at my command. Last year the highly cultivated land yielded upwards of 300lbs. per acre, and the badly cultivated only from 50lbs. to 60lbs. per acre, and the whole Plantation, with an outlay of little more than Rupees 9,000, yielded 12,562lbs. of Tea and 25,000lbs. of seeds, and two millions of seedlings, vast numbers of which were distributed to private individuals. Armed, therefore, with such results, I applied to the Honorable the Lieutenant-Governor for additional support in my letter No. 586 dated 13th December last to your predecessor's address, which his Honor was pleased to grant, and with the increased establishment, the quantity of Tea prepared this season has been considerably increased, even though our work was paralysed for a time by the appearance of that scourge the Cholera amongst the establishment, and by which we lost one of our most able Chinese Tea manufacturers.

Mr. Fortune also states that the factory and godown accommodations are too small to meet the rapid progress which the Plantations are making, and the new method of preparing black Teas introduced this season. Had he reported to me that large accommodation was required for spreading out the fresh leaves, all would have been ready for the Chinese before their arrival at the Plantations. Until, however, Tea making by the men imported this season commenced, I was not aware that their operations were cramped for want of room. But I did not lose a moment's time to remedy the evil. As soon as I saw what was required, I at once asked the sanction of the Honorable the Lieutenant Governor to increase the accommodation by enlarging all the factories and godowns, and as readily received authority to do so. But, in addition to this, other works have been carried on. Two new factories have been erected. Twenty-three new Chinese and two additional Overseers have been comfortably housed, and two large Plantations established. In fact, had the same support as is now received from Government been given years ago, the North West Provinces might now have been exporting Teas as a staple article of produce.

* See my Letter No. 586, dated 15th December 1855.

The suggestions made by Mr. Fortune regarding the selecting of land for Tea Plantations, but particularly with reference to the land of the new Plantations at Bhurt-poor, in the Bheemtah District, and Ayar Toh in Kutwar, lately established by me, tell to the Government and public nothing that has not frequently been made known by me. The two Plantations, consisting each of several square miles, have all kinds of land, and I need now scarcely add that the Overseers have already received orders to cultivate only the good and sound land. In these Plantations the tracts first to be cultivated have already been marked out by me, and, as a standing order, all land, before being planted, is carefully ploughed and trenched, and all weeds removed, and if a Tea cultivator wishes to succeed he must do this. For Mr. Fortune to offer this as a suggestion is surprising, seeing that in every Plantation visited by him he saw numbers of ploughs at work (many of these American ploughs) breaking up new land and thus economising labour, and these followed by other parties with spades and rakes, removing all weeds, and deepening the cultivation where it was necessary, as on deep cultivation so much depends the good condition of the Plantation, and by it the value of manures is so much increased. I would, therefore, strongly impress on the minds of all agriculturists, be they cultivators of Tea or any other produce, to plough or trench deeply and to employ the most efficient implements for doing so.

With reference to the Chullar Plantation, Mr. Fortune states that some of the young plants have been badly planted, and that, too, on badly prepared land, and further remarks that the Overseer was quite new to his work. The latter remark is perfectly true, but the land was not badly prepared. It received great labour, and several hundred loads of stone were removed from it. These I pointed out to him in order to explain its poverty, and it would never have been planted at all had there been any other land at Hawulbaugh at my disposal for the purpose. But as I had the option either of destroying a number of young seedling Tea plants that I had in beds, or planting them on this land, I ordered it to be done. And with reference to the lands in Chullar liable to be injured by water during the rains, I stated, in a Report sent to Mr. Secretary Thornton in August 1847, which was published, and a copy furnished to Mr. Fortune, that "land liable to be flooded during the rains, and upon which water lies for any length of time, is detrimental to the growth of the Tea plant," and in the same Report I gave an example, and strongly recommended that all land of this description should be avoided by the cultivator. That everywhere in the neighbourhood of Hawulbaugh there is abundance of fine land fitted for Tea cultivation, and better adapted than many places in the Chullar Plantation, I am perfectly well aware; but Mr. Fortune forgets that I cannot go where I like, and take land as I like, even though it be for Government purposes. Land is available by purchase close to the capital of Kumaon; but I have never been authorized to obtain it in this manner. Government have always acted justly and considerately towards the native community. Thus land obtained from the Zemindars in the neighbourhood of Now Kouchia Tal to try a Tea experiment, with a guarantee from the Assistant Commissioner to be returned to them after it had been tested, has been returned by orders of

the Honorable the Lieutenant-Governor; and it would have been highly unjust and impolitic not to have acted up to the guarantee made with them.

With reference to the preservation of the lately imported Tea plants from China, the best arrangements have been made by me to keep them perfectly distinct from the other plants. Certain portions of each Plantation have been allotted to them, and tickets noticing their locality, cut out in wood and with iron pegs appended, have been placed in each division. In the Plantation books a prominent notice has been made regarding their locality to provide against any contingency. Mr. Fortune was also informed regarding the arrangements adopted to keep them apart from all other plants in the Plantation. To stock the Plantations with the finest variety of Tea plants was one of the chief objects I had in view in soliciting Government to depute Mr. Fortune again to China; it, therefore, would have been highly culpable on my part had I, on receiving these plants, not made proper arrangements to keep them quite distinct from other plants in the Plantation. With regard to the Hawulbaugh Plantation, every coniferous tree in that Plantation has already been cut down, barring a very few, which are highly ornamental; and it would, I think, be highly injudicious to ruin the appearance of one of the prettiest estates in the hills, and thus deteriorate its value in order to obtain a few additional pounds of Tea. As for useless seedling fruit trees all have been removed, and annually large numbers have been cut down when they have been found detrimental to the Tea plant. There is no doubt that coniferous trees are detrimental to Tea cultivation; and this fact I have always known and acted upon.

Regarding native cultivators, Mr. Fortune states correctly that not much progress has yet been made, still several have flourishing Plantations. I allude particularly to Syee Ram's Plantation at Hawulbaugh, and Juggut Ram's Plantation at Pooree. The Piergram Plantation, belonging to Dowlut Sing, whose condition has been so lamented by Mr. Fortune, was not in good order when we visited it; this was caused by the assamees of Dowlut Sing cultivating Rice above his Tea nurseries, by which great injury was done to his Plantation. That such treatment was highly detrimental, the proprietor was well aware; but had he immediately interfered with his assamees the proprietor was well aware; but had he immediately interfered with his assamees and removed their Rice, they would have at once left him, and gone elsewhere, land in this district being plentiful and of little or no value. And I may here add that the proprietor is now convinced of the folly of neglecting his Tea farm, and I trust the next season to see a great improvement and the Rice altogether eradicated. When the man complained that he had no leaves to give, it was scarcely to be expected, as the first crops had already been plucked and sent to the factory. But what the man most complained of was that he could not instil into the minds of his assamees the necessity of preventing the Tea plants being deluged with water. By Dowlut Sing 19 maunds of leaves have been brought to the factory this season, and for which he has received Rupees 152-0-0. The rent levied on his whole estate, consisting of some square miles, by Government, is only Rupees 40.

The other native Plantations, though small, have been well cultivated, and will yield a considerable return next season. In addition to natives, several Tea

Plantations have been established in different parts of India by Europeans, to which Mr. Fortune has not alluded. In Kumaon Messrs. MacIver and Wheeler have settled, and been largely supplied with plants and seeds. In the Deyrah Dhoon Colonel Elwall and Captain Thulwell have established a large Plantation with complete success, and to them upwards of three lakhs of plants and twelve thousand pounds of seeds have been given. In the Simla District Mr. Purkely has commenced Tea planting, and has been liberally supplied with plants and seeds. In Assam Mr. Carnegie has established himself as a Tea-planter in a Government grant, and been liberally supplied with seeds. The Assam Company, anxious to improve their Tea Plantations by introducing Kumaon seeds, have also been liberally supplied. In Cachar several Calcutta firms have taken up Government grants for the purpose of cultivating Tea, represented by Mr. Bugby, Mr. Saunders, Mr. Schiller, all of whom have been or are being supplied with seeds. At Darjeeling several parties have taken up grants and have there commenced Tea cultivation, and I believe there are upwards of 10,000 acres of good land available for the purpose. Into the Cashmere valley the Tea plant is being introduced by the Maharajah Golaub Sing, I, at the request of His Highness, through the Commissioner of Lahore, having sent him thirty coolie loads of plants and twelve loads of seeds. This rapid statement shows that the cultivation is now attracting very considerable attention, and that parties are entirely indebted to the Government Plantations for plants and seeds to carry on operations, and have thus been saved great expense, as the plants and seeds distributed from the Government Plantations are given gratis. But Mr. Fortune recommends Government to interfere and prevent private capitalists preparing Teas on their own account, as he states that Teas produced on such farms would not be properly manufactured, and if either sold in India or exported to Europe would give the Himalayan Teas a bad name, which they would be years in getting rid of. Some years ago, when Tea-preparing was in its infancy in the North-West Provinces, I recommended such a policy to be pursued in my letter No. 538 dated 15th December 1851; but the time has now gone by, as the Teas prepared at the Government factories have obtained for themselves a high character, and as Government have freely offered to supply all parties with seeds and plants and tracts of land to grow them in, provided they can show that they have capital to work with. In face of this liberal policy it would be useless to dictate to speculators what to do with the produce of their farms, and instead of trying to check the advance of Tea cultivation by European cultivators, which such a measure would tend to do, the natives educated in the Government factories, when sufficiently competent to conduct operations without the aid of the Chinese, ought to be allowed to enter the employment of private cultivators and assist them in making Teas. Acting on this principle, and well aware of the liberal policy now adopted by Government, I have already made over to private parties several native Tea makers, and by them, particularly on the Hurbunswallah estate and at Lobah, some very creditable Tea has been prepared. Each native farmer must learn to make, as well as to grow, his own Tea, and surely what is conceded to natives will be equally so to Europeans. With this

view, therefore, I have a large number of native apprentices in each of the factories, and am prepared to give to any party cultivating Teas on their own account several of these men, provided that they will guarantee them proper wages for a certain length of time.

Regarding the question of Tea cultivation viewed as investment for English capital, I shall refrain at present from entering on this subject, as it will form the subject of another communication, which, in conjunction with the Commissioner of Kumaon, I am now preparing for Government for the benefit of capitalists.

In conclusion, though I have considered it just to myself and hard-working overseers to make the above remarks on Mr. Fortune's Report, yet still I have the greatest satisfaction in admitting that his services have been invaluable to the Plantations. Large supplies of fine kinds of Tea plants, implements in large numbers used in making green and black Teas, several sets of black Tea makers, two sheet lead makers with implements complete, have been sent by him from China, by which I am now enabled to work efficiently six factories. The duties, therefore, for which he was principally deputed to China have been well and efficiently done.

WM. JAMESON,

Supdt. Botanical Garden, N. W. P.

SAHARUNPOOR, }
17th November 1856. }

From the Commissioner of the Kumaon Division, to the Government North-Western Provinces.

I shall confine my remarks to the question of Tea growing and Tea making by Europeans and the natives of Kumaon.

Whatever quantity of Tea cultivation we may have, the manufacture of Tea must, in my opinion, remain in the hands of Europeans for many years. There is no native in this Province with sufficient capital and energy to set up an establishment capable of producing good Tea on a remunerative scale. The few monied men who could furnish funds would not leave their own peculiar business to superintend Tea making; they would be too wise to entrust a large establishment to an ill paid agent, and at the same time they would not have the wisdom to employ a well paid overseer. If the attempt were made by a Zemindar on a small scale, ignorance or carelessness would prevent that success which is necessary to make the manufactured article saleable at a profitable rate. Although natives can cultivate the shrub most profitably, I consider that it would be unwise to encourage them to do more at present, and if they rear a number of small Plantations capable of supplying a factory there will be no want of European manufacturers to purchase the raw leaves.

Mr. Fortune's last Report conveys the impression that European settlers will find it difficult to make a Tea speculation on a limited scale pay well, and he is altogether in favour of a Company with a large capital. I cannot agree with Mr. Fortune in thinking that the small capitalist would be disappointed; if so, I feel sure

that he would only have to blame himself for bad management. As regards the cultivation of the plant, the expense of workmen would in both cases be pretty nearly the same, *i. e.*, if one man on 4 Rupees a month looks after 4 acres of land under Tea, 500 and 5,000 acres would proportionately carry the same expense; the relative cost of erecting factories would in a great measure be in proportion to the size of the building. The large Company would have some advantage in the charge for Chinamen; but that is balanced by the pay of trustworthy overseers to look after the Company's interests. A small capitalist would look carefully after his own property, and not debit the speculation to the same extent with the value of his time; for such superintendence would be his pleasure as well as employment.

I have no hesitation in asserting that in this Province no small capitalist could find difficulty in rearing a large healthy Tea Plantation. I have had the pleasure of looking after three which were under the immediate charge of such men as are procurable in hundreds in Kumaon. I seldom visited them more than twice a year; and Mr. Fortune, in his former Report, stated that the Kutwar shrubs were equal to any he had seen in China, and in his last Report he notices my Hawulbaugh garden in the most favorable terms. This is satisfactory proof that these three Plantations succeeded well: and it is difficult to conceive any European settler with energy to embark capital and expend time on a Tea Plantation who had not the intelligence of a native worth 6 Rupees per mensem. All requisite information and assistance are readily given by the Superintendent and his overseers, and with the aid of existing Reports on the subject, by spending a month in the Government Plantations of Hawulbaugh, any European ought to know every thing about sowing, planting, plucking and manufacturing Tea. The Sobha Plantation, now belonging to Sir W. Richards, is in a most flourishing state, and that has up to the present time been under the charge of a native who was never employed in any Government Tea Garden. I could instance equal success in other cases, and I know of no one case where the attempt to rear Tea plants has failed. Mr. Fortune notices the fact of a Zemindar having sown Rice among Tea plants in the Kutwar Gardens. Dr. Jameson informed me of this soon after the Rice was sown, and on enquiry I found that the owner of the Plantation was absent when this was done. The sowing of Rice was not the result of ignorance, but it was done with the intention of injuring the Tea plants.

I would not recommend any capitalist to take a Government grant of land at first, because clearing it hurriedly is expensive, and the probability is there would not be much bad and indifferent land mixed with the good portions in such a tract. With a little patience and enquiry it is always possible to purchase a village at a distance from Almorah in the less cultivated parts of the Province. A village with 40 or 50 acres of cleared land and two to three hundred of forest land might be bought for about 500 Rupees. The present settlement jumma of such a village would not exceed 30 Rupees per annum. The cleared land would be sufficient for many thousands of plants, and capable of rearing lakhs of seedlings. The planter could by degrees, while his men were idle, clear away the forest, make arrangements with surrounding villagers for the use of as much land as he required, erect the factory, and at a small expense be ready to commence the manufacture of Tea with a full knowledge of

every thing connected with the subject, from the sowing of the seed to the packing of the Tea.

There are now many natives at the Government factories capable of making Tea, and I believe Dr. Jameson would allow them to engage with any planter requiring their services. As they have worked for years with the Chinamen, and by having manipulated the leaves from the first heating to the last drying are thoroughly acquainted with the whole process, there would be no difficulty in procuring Tea makers.

I am surprised that so few have settled as Tea planters. There is no risk as in Indigo. Drought or storms of hail may diminish the supply of leaves for a time, but failure is impossible. No animals destroy the plant. There is no chance of good Tea becoming unsaleable. The occupation is a healthy one, the climate delightful, and the superintendence of such a nature that the Plantation may be left from time to time without risk.

I do not recommend the transfer of the Government Plantations to a Company at present. Government have incurred great expense during the last 20 years in proving that the Tea plant thrives well in this Province. Hitherto there has been a demand for all the seeds and seedlings that can be produced. The natives are by degrees beginning to understand that no great skill is required in the cultivation of the shrub, and as soon as the few who have small gardens prove to their neighbours that a Tea crop is far more profitable than Rice, Wheat, or any other grain, the cultivation of Tea will become popular. If a Company got possession of the gardens, seeds would be sold or given on conditions that the natives would not enter into. Circumstances might induce the Company to abandon the speculation, or the management might fall into the hands of a person unsuited to it; and the result would be that the natives would cease to take an interest in growing Tea before they were fully convinced of the advantages of it. If one Tea Company were to get the whole of the Government gardens, no small capitalist would settle in the Province except at great disadvantage, for he would either have to purchase seeds and seedlings from the Company, or confine his operations to very narrow limits. If one large Company existed to the exclusion of all others, they could fix any price they chose for raw leaves. The natives who had reared small Plantations might be disgusted at feeling themselves compelled to sell their leaves at a low rate; and native Tea Plantations would soon be neglected. I am of opinion that small and native Tea Plantations would settle in different parts of the Province as Companies or individual capitalists settling in different parts of the Province is the means most likely to make Kumaon a Tea-growing country. A very small Company can command the sums requisite for the support of a paying Plantation and a factory with establishment to manufacture as much Tea as could be produced for the next ten years; and as the operations of such a Company become more extended, its capital might easily be increased. The more small Companies the better; but let the Government Plantations be kept up for a few years to supply seeds and seedlings until there are other Plantations from which these may be procured. As soon as a few private capitalists or small Companies have established themselves

in the Tea line, the Government gardens might be disposed of without risk of injury to the Province.

H. RAMSAY,
Commissioner.

The 10th February 1857.

From the Superintendent Botanical Gardens, to the Government North-Western Provinces.

In my letter, dated November 17 1856, I did not enter into the question of the best course to be adopted for the extension of Tea cultivation in the Kohistan of the North-Western Provinces and the Punjab, because, before doing so I was desirous of laying before Government a complete and detailed guide to speculators on all subjects connected with it. This Report is now finished, and will shortly be submitted. I regret, however, that there has been so much delay on my part, which has been unavoidable. In November last, in the Cis-Sutlej States, my office boxes were carried off by thieves, though under a guard and within a few yards of a Government thannah. Thus I was deprived of all my papers containing data connected with Tea cultivation. At Umballah the Deputy Commissioner stated that he would do his utmost to recover the property stolen, and as the papers were of no value to any one he doubted not but that they would shortly be forthcoming; since then a few papers only, of no consequence, have been recovered.

In a former Report I submitted a statement showing the amount of capital required to cultivate six thousand acres of land and the return. The statements furnished by Mr. Fortune, being founded on data derived from the Government Plantations, as he could not obtain any satisfactory information on the subject when in China, is an approximation and of value. But it is a vast mistake to suppose that land fitted for Tea cultivation is limited, and that therefore capital embarked in the undertaking would be confined to narrow limits. The Tea plant is thriving well from Hazarah, in the Sind Sagur Doab of the Punjab, to the Kalee River, the Eastern boundary of the British Province of Kumaon in the Himalayas, or over 50° of latitude and 8° of longitude. Here, therefore, is a vast opening for capital. It has been stated that were natives generally to become tea-drinkers, the quantity of Tea produced by all the available land in Kumaon, Gurhwal, Deyrah Dhoon, and the Kohistan of the Punjab and other mountainous Districts joining the Northern boundary of the British Empire, would not form an infinitesimal part of the demand. I have made a rough calculation, and by it appears that the Kangra Valley is capable of producing Teas to the extent of lbs 88,500,000; and these results might be brought about without greatly interfering with the cultivation of other crops. Were each village community to appropriate a certain portion of land for the purpose,—a system which obtains in the Tea Districts of China,—waste and other lands fitted for Tea cultivation may be

estimated in Kumaon at 350,000 acres, and the general return, when in full bearing, may be given at 100 lbs of Tea per acre = lbs 35,000,000

Eastern Gurhwal, acres	18,000	=	„	18,000,000
Western Gurhwal, acres	180,000	=	„	18,000,000
Deyrah Dhoon, acres	100,000	=	„	10,000,000
Jonsar Barun, acres	10,000	=	„	1,000,000
Kooloo, acres	35,000	=	„	3,500,000
Kangra Valley, acres	30,000	=	„	3,000,000

lbs 88,500,000

Nor does this estimate include large tracts of country admirably fitted for Tea cultivation in Hazarah, Cashmere, Junmoo and protected Sikh States, which might afford an additional 200,000 acres, or 20,000,000 pounds of Tea, and thus bring up the amount to 100,000,000 lbs (a hundred millions of pounds),—a quantity equal to the whole export trade of China; and with high cultivation the figures might be doubled, and thus not only allow an immense quantity for the use of the Indian community, but at the same time afford a supply for a vast export to other countries.

I have rated the average return at 100 lbs per acre. Throughout the whole of the older Plantations the yield is nearly double this figure.

These brief preliminary remarks show to what important results Tea cultivation might be brought in this country by British capital and British enterprise, as I quite concur with Captain Ramsay that no native will risk his money extensively in such an undertaking, it being foreign to his nature to do so.

But let British capital and enterprise be embarked in proportion to the importance of the cultivation and the support it merits, and thus give employment to thousands of poor but able-bodied and excellent workmen, when their labours are properly directed, and these hills will soon become as important to the State as any Province of the plains. Labour is cheap, the climate is admirably fitted to the European constitution, the people are docile and easily guided, provided that they are properly treated and their prejudices respected.

In some Districts the population is wretchedly poor, and scarcity caused by the malarious jungle and the ravages of wild animals. But in the hands of Europeans, backed by capital, these Districts, in a few years, would be reclaimed, the jungles would disappear, and with them malaria and wild animals, and thus in proportion would the prosperity of the country advance which at present is in a pre-eminently backward condition, and this caused by the want of capital.

At the present moment the exports from the British Hills are, comparatively speaking, a cypher, and thus give but a small return for the capital invested in making and keeping up roads, and opening up the country; and until a country is opened up by good roads it can never make advances in its social condition, but must ever remain in its semi-barbarous state, the greater portion of its male population being employed as beasts of burthen. Let, therefore, Tea, aided by British capital and enterprise, be generally introduced, and means will at once be presented to open up the hill country.

I have respectfully urged on Government the importance of having all the waste lands fitted and available for Tea cultivation roughly surveyed for the benefit of capitalists, which, however, has been objected to by the District Civil Authorities on the plea of expence. But if it be the desire of Government to see British capital extensively employed in opening up the Kohistan of the North-Western Provinces without guarantees, or the money invested, detailed information as to the state of the country, kind of land available for Tea cultivation, &c., must be produced. In the guide to Tea-planters, which I have drawn up, and which will shortly be submitted, I have endeavoured to be as explicit as circumstances will admit; but the details which every capitalist wishes to have regarding the country before he invests his money are not forthcoming, as they do not exist, because to furnish them would necessitate the employment of several parties to survey the country. Captain Ramsay is surprised that more Tea-planters have not yet come forward to take up the cultivation since the publication of the highly liberal Government notification regarding land. I am not, because when it is considered that Kumaon and Gurhwal have been a British Province since 1815, and that it is still covered with dense virgin forests, that wild animals have in many places usurped the place of man, that roads were unknown barring the Central or Trunk Road, and that Europeans desirous of settling and cultivating lands were always discouraged and received no countenance until lately from the Authorities, that no information on the state of the country and its resources, barring the meagre details given in Messrs. Traill's and Battin's Reports, is extant, it is not to be wondered at that parties, particularly parties in England, hesitate to embark capital. But a new era is now dawning on the Provinces. Good roads from the Tea Districts fitted for beasts of burthen are being made, thus rendering available for cultivation the hands that were employed as carriers, and these roads will no doubt ere long be connected with a net of rails, which, sooner or later, must traverse Rohileund in order to enable its produce to take its stand with other and more favoured Districts.

When this is brought about, distant and good markets will always be available for the produce of the hills, and thus render Tea cultivation more profitable.

I have shown that there is a vast field available for British capital. The small capitalists can enter on the cultivation with success, I quite agree with Captain Ramsay, provided that they enter on their work with health, energy and activity and are backed by capital of not less than Rs. 50,000 or Rs. 60,000. With this capital he would be able to take up a hill grant of 15,000 acres, and would thus work it, a third of the land being considered bad or reserved for roads, &c.—Table I

In the appended Table I have credited the Teas at a very low rate. For many years parties would always sell a considerable quantity in India at double the price stated. But for great profits to result in Tea cultivation parties must be always well backed by capital to enable them to go on.

Government has offered land to all parties on most liberal terms, which term will, I suppose, equally hold good, be the land taken up by a single individual or by a Company. The latter require no privileges. The course laid down by Government for them to pursue is clear, and were Government to guarantee to them any

privileges, and deny the same to private individuals or to natives, residents of the Province, they would depart from that even-handed justice which has ever been their distinguishing character.

I quite concur with Captain Ramsay that the time has not yet arrived for Government to relinquish their Plantations. Every seed available last season was indented for by different parties, and though Captain Ramsay states that he is surprised at so few parties having come forward to invest capital in Tea cultivation, yet still Tea cultivators are springing up in all directions from Cashmere to Cachar. In my letter to Government No. 694, dated November 17th 1856, I gave a detailed list of the different parties that had been supplied with plants and seeds, and I have already several indents for seeds from parties for the ensuing season. The liberal manner in which Government allow their plants and seeds to be distributed, and the notification lately published regarding land, have been the chief causes that have led parties to invest capital in the cultivation, and were their exertions now to be checked, and Government Plantations handed over to a private Company, it would lead to their ruin, and all attempts made by natives be brought to a stand. But there is a limit to Government cultivation. Let once the field be fairly occupied by private parties or Companies well backed by *bonâ fide* capital, and it will be time enough for Government to consider the matter. The field is a wide one, and there is plenty of room for many Companies and private parties, and over such a vast country a million sterling, if not more, would readily find employment.

WM. JAMESON,
Supdt. Botanical Gardens, N. W. P.

March 17, 1857.

Cr. Table showing the Expenditure incurred in Planting and Culti-

INCOME.		
3rd Year.		
By Tea prepared in 3rd year, from 400 acres, at lbs. 20 per acre. $400 \times 20 =$ lbs. 8,000, at 1 Rupee per pound ..	8000	0 0
4th Year.		
By ditto ditto in 4th year, from 400 acres, at lbs. 40 per acre. $400 \times 40 =$ lbs. 16,000; and ditto from 400 acres, at lbs. 20 per acre. $400 \times 20 =$ lbs. 8,000. In all lbs. 24,000, at 12 annas per pound ..	18000	0 0
5th Year.		
By ditto ditto in 5th year, from 400 acres, at lbs. 80 per acre. $400 \times 80 =$ lbs. 32,000; and ditto from 400 acres, at lbs. 40 per acre. $400 \times 40 =$ lbs. 16,000; and from 2,000 acres, at lbs. 20 per acre. $200 \times 20 =$ lbs. 4,000. In all lbs. 52,000, at 8 annas per pound ..	26000	0 0
6th Year.		
By ditto ditto in 6th year, from 4,000 acres, at lbs. 150 per acre. $400 \times 150 =$ lbs. 60,000; and from 400 acres, at lbs. 80 per acre. $400 \times 80 =$ lbs. 32,000; and from 200 acres, at lbs. 40 per acre. $200 \times 40 =$ lbs. 8,000. In all lbs. 1,00,000, at 8 annas per pound ..	50000	0 0
7th Year.		
By ditto ditto in 7th year, from 400 acres, at lbs. 200 per acre. $400 \times 200 =$ lbs. 80,000; and ditto, from 400 acres, at lbs. 150 per acre. $400 \times 150 =$ lbs. 60,000; and from 200 acres, at lbs. 80 per acre. $200 \times 80 =$ lbs. 16,000. In all lbs. 1,56,000, at 8 annas per pound ..	78000	0 0
8th Year.		
By ditto ditto in 8th year, from 800 acres, at lbs. 200 per acre. $800 \times 200 =$ lbs. 1,60,000; and ditto, from 200 acres, at 150 per acre. $200 \times 150 =$ lbs. 30,000. In all lbs. 1,90,000, at 8 annas per pound ..	95000	0 0
Carried over, Company's Rupees ..	275000	0 0

Dr. vating 1,000 Acres of Land, extending over 8 years, and the Return.

EXPENDITURE.		
1st Year.		
To Plantation Establishment.		
1 Moonshie, at 10 Rupees per month. 10×12 ..	120	0 0
2 Chuprassies, at 5 Rupees each per month, 10×12 ..	120	0 0
2 Chowdries, at 8 Rupees each per month, 16×12 ..	192	0 0
2 Assistant ditto, at 7 Rupees each per month, 14×12 ..	168	0 0
120 Mallies, at 4 Rupees each per month, 480×12 ..	576	0 0
	6360	0 0
To Extra Establishment.		
1 Carpenter, at 8 Rupees per month. 8×12 ..	96	0 0
1 Smith, at 8 Rupees per month, 8×12 ..	96	0 0
	192	0 0
To Extraordinary Expenses.		
Building a House for Planter ..	1600	0 0
Implements, Bullock, &c. ..	700	0 0
	2300	0 0
	8852	0 0
2nd Year.		
To Plantation Establishment ..	6360	0 0
" Extra Establishment ..	192	0 0
" Extraordinary Expenses, Implements, &c. ..	800	0 0
	7352	0 0
3rd Year.		
To Plantation Establishment ..	6360	0 0
" Extra Establishment ..	384	0 0
" Native Tea-maker's Establishment.		
1 Jemadar, at 10 Rupees per month, 10×12 ..	120	0 0
12 Native Tea-makers, at 5 Rupees each per month, 60×12 ..	720	0 0
	840	0 0
" Extraordinary Expenses, Wood for boxes. &c. ..	800	0 0
" Building a Factory ..	2000	0 0
	10384	0 0
4th Year.		
To Plantation Establishment ..	6360	0 0
" 30 Extra Mallies, at 4 Rupees each per month, for 5 months ..	600	0 0
" Tea-maker's Establishment ..	840	0 0
" Carpenters, &c., planking Teas ..	800	0 0
" Extraordinary expenses, land rent, wood for boxes, making ditto ..	1800	0 0
	10400	0 0
Carried over, Company's Rupees ..	36988	0 0

Carried over, Company's Rupees ..

Cr. Table showing the Expenditure incurred in Planting and Culti-

Brought forward, Company's Rupees		275000	0	0
Total, Company's Rupees		275000	0	0

OFFICE OF THE SUPDT. BOT. GARDENS N. W. P. }
Saharunpore, 17th March 1857. }

ating 1,000 Acres of Land, extending over 8 years, and the Return. Dr.

Brought forward, Company's Rupees		36988 0 0
<i>5th Year.</i>		
To Plantation Establishment	6360 0 0	
„ 40 extra Mallies, at 4 Rupees each per month, for 5 months	800 0 0	
„ Tea-maker's Establishment	900 0 0	
„ Tea-packing Establishment	900 0 0	
„ Extraordinary expenses, carriage of Tea, land rent, extra coolies, &c...	3000 0 0	
		11960 0 0
<i>6th Year.</i>		
To Plantation Establishment	6360 0 0	
„ 60 extra Mallies, at 4 Rupees each per month, for 5 months	1000 0 0	
„ Tea-maker's Establishment	1200 0 0	
„ Tea-packing Establishment, Carpenters, &c.	1200 0 0	
„ Extraordinary expenses, carriage of Teas, land rent, wood for box making, extra coolies, &c.	4600 0 0	
		14360 0 0
<i>7th Year.</i>		
To Plantation Establishment	6360 0 0	
„ 150 extra Mallies, at 4 Rupees each per month, for 5 months	3000 0 0	
„ Tea-maker's Establishment	2000 0 0	
„ Tea-packing Establishment, Carpenters, &c.	1800 0 0	
„ Extraordinary expenses, carriage of Teas, land rent, wood and lead for boxes, extra coolies, &c.	6500 0 0	
		19660 0 0
<i>8th Year.</i>		
To Plantation Establishment	6360 0 0	
„ 250 extra Mallies, at 4 Rupees each per month, for 5 months	5000 0 0	
„ Tea-maker's Establishment	2500 0 0	
„ Tea-packing Establishment, Carpenters, &c.	2200 0 0	
„ Extraordinary expenses, carriage of Teas, land rent, wood and lead for boxes, extra coolies, &c.	3000 0 0	
		24060 0 0
* By remaining in hand as profit		167972 0 0
Total, Company's Rupees		275000 0 0

* In this Table I have omitted interest for capital invested, extra carriage, remuneration to Planter for 8 years, &c., auction fees, &c., &c.

WM. JAMESON,
Supdt. Botanical Gardens, N. W. P.

A SHORT GUIDE TO PLANTERS CULTIVATING TEAS IN THE HIMALAYAS
AND KOHISTAN OF THE PUNJAB, WITH BRIEF REMARKS ON THE MANU-
FACTURE OF BLACK AND GREEN TEAS, IMPLEMENTS IN USE IN THE
FACTORIES AND PLANTATIONS, &c.

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CHAPTER I.

Kinds of Tea plants cultivated.

When Government resolved on trying the experiment of cultivating Tea in India, they deputed Doctor Gorden to China to acquire information respecting the cultivation and manufacture of Teas, and to procure Tea seeds. Aided by Doctor Gutzlaff he procured a quantity of seeds from the mountains in the Amoy Districts. These seeds were sent to the Calcutta Botanical Garden, where they were sown in boxes. On germinating they were sent up the country in boats, some to Assam and some to Gurmuktesur, and from thence to Kumaon and Gurhwal. From these plants date the commencement of the Tea Plantations in the Himalayas. Tea was first made in Kumaon in 1841, and the samples sent to England, and were pronounced to be of good quality fitted for the Home markets and similar to the Oolong Souchong varieties. Thus Messrs. Thompson, of Mincing Lane, reports on a sample sent by us to Doctor Royle in 1842:—"The sample of Tea received belongs to the Oolong Souchong kind, fine flavoured and strong. This is equal to the superior black Tea generally sent as presents, and better for the most part than the China Tea imported for mercantile purposes." By many it was supposed that there were different species of the Tea plant, and that the species cultivated in the South Districts of China was different from that met with in the North. To solve this mystery, and at the same time procure the best varieties of the Tea plant, Mr. Fortune was deputed to China. By him large numbers of Tea plants were sent from different Districts of China celebrated for their Teas, and are now thriving luxuriantly in all the Plantations throughout the Kohistan of the North-West Provinces and Punjab. Both green and black Tea plants were sent, the former from Whey Chow, Mooyeen, Chusan, Silver Island, and Tein Tang, near Ningpo, and the latter from Woo-e San, Tein San and Tsin Gan, in the Woo-e District. But so similar are the green and black Tea plants to each other, and the plants from the Amoy Districts, that the most practised eye, when they are mixed together, cannot

Several varieties. separate them, showing that they are nothing more than mere varieties of one and the same plant. the changes in the form of the leaf being brought about by cultivation. Moreover, throughout the Plantation fifty varieties might easily be pointed out; but they run so into each other as to render it impossible to assign them any trivial character, and the produce of the seed of different varieties do not produce the same variety only, but several varieties, proving that the changes are entirely owing to cultivation, nor do the plants cultivated at 6,000 feet in the Himalayas differ in the least in their varieties from those cultivated at 2,500 feet of altitude in the Deyrah Dhoon.

That the Assam plant is a marked species is true, it being distinguished by its large membranous and lanceolate leaf, small flower and upright growth.

Assam species.

It is a very inferior plant for making Tea, and its leaves are therefore not used. Though the plants received from the different Districts of China do not differ from those first sent to the Plantations, it is highly important to know that the Tea plants from well-known green and black Tea Districts of China now exist in the Plantations, as it is stated that local causes exert a great influence in the quality of the Teas, as much as the manufacture does. The expense, therefore, incurred in stocking the Government Plantations with the finest kinds and varieties of Tea plants procurable in China, though great, will be amply repaid. From them superior kind of Teas are produced. This, however, I doubt, as the Teas prepared from the first imported plants have reached a perfection not surpassed by any Chinese produce.

Soil best adapted for the Tea plant.

The soil in which the Tea plant is now thriving in the Himalayas, Kangra and Deyrah Dhoon Valleys, varies exceedingly; but the best is a light but rather rich soil containing a good deal of humus or vegetable mould mixed with sand. At Bhurtpoor and Kutwar, Kumaon, it is of a light silico-aluminous nature, with a thin superstratum of vegetable mould, and abounding with small pieces of clay-slate the subjacent rock. In the Bhurtpoor District trap rocks are also met with in the form of dykes cutting through the subjacent rock; the clay-slate is highly metamorphic, being almost entirely composed of mica, and in places it is mixed with quartz, forming mica slate. The same is the character of the soil in the neighbourhood of Almorah, and at Pooree in Gurhwal. At the Hawulbaugh part the soil consists of a stiff red clay, owing to peroxide of iron. This soil, when well broken up, exposed to the air or oxygenized and manured is well suited for the Tea plant. In order to lessen its adhesiveness, if it be very adhesive, much advantage will be found by mixing some river sand with it, viz., one part of sand and two of manure.

In the Deyrah Dhoon it varies exceedingly, being in some places as clayey and stiff, and in others made up of sand, gravel and vegetable matter.

Soil of the Deyrah Dhoon. The sub-soil of various thickness is always stony, and thus acts as an excellent drain, and owing to this character it requires to be well-manured, as all the richness of the super-soil is washed away, or filtered through the substrata during the rains. When a Plantation is, therefore, formed in such a locality, it ought to be manured twice or thrice annually, viz., at the end of the rains and in the spring, or in February and March, or before the new leaves begin to sprout. In the Kangra

Soil in the Kangra Valley. Valley, where the Plantations have been formed, there is a sub-soil of red clay in which rests a rich black loam, formed of decomposed vegetable matter, varying from a few inches to a foot. The sub-soil abounds, with boulders of large granular granite, with large crystals of felspar, or, in other words, it is a porphyritic granatic. The felspar is a kali felspar and easily decomposed, and

Flat and sloping land both favorable for Tea cultivation.

hence one of the chief causes of the richness of the soil. The boulders, too, act as pipes in draining the land. It matters not whether the land on which a Plantation is formed be slaty or highly inclined, provided the soil is good and well drained; but on no occasion ought Tea Plantations to be formed on lands liable to be flooded during the rains, as they

are sure to end in disappointment. In such lands plants will never repay the trouble and expense of the planter. Such lands are numerous in the Himalayas, and are therefore to be avoided. In many places in the Himalayas, during the rains, water oozes from the sides of the mountains, rendering the adjoining lands marshy for five or six months of the year. This is very liable to happen in clay-slate Districts, where the rocks have a high inclination, *viz.*, from 50° to 60°. This kind of land being unfitted for good Tea cultivation is to be avoided, or rather not worth planting, though there may be plenty and adjoining of first-rate quality in the same farm. In lime-stone Districts, particularly magnesian lime-stone, where the Tea has been tried, it has never succeeded well, if the soil is thin and untransported, which can easily be ascertained by examining its nature. If the soil abounds with angular masses of lime-stone, which correspond in characters with the adjacent rocks, then it may be inferred that the soil has been formed from the decomposition of that rock, vegetable matter, and such districts ought, therefore, to be avoided.

Lands flooded during the rains bad for the Tea plant.

Lime-stone Districts not suited for the Tea plant.

Altitude above the Sea best fitted for the Tea plant.

The Tea plant is now thriving admirably in the Deyrah Dhoon in latitude 30° 20' and at an altitude of 2500 feet. At Ahnorah, in latitude 25° 30' and at an altitude of 5500. At Pooree, in Gurhwal, in latitude 29° 28' and at an altitude of 6000 feet. At Dolta, in the Kangra Valley, in latitude 32° and at an altitude of from 3000 to 4500 feet.

In all these localities the plant is thriving equally well, showing how hardy it is, and well fitted for the climate of the Himalayas and Kohistan of the Punjab. In all these localities Teas have been prepared for several seasons.

Tea plant hardy.

CHAPTER II.

On the method of preparing ground prior to forming a Plantation, viz., fencing, draining, ploughing, trenching.

In forming a Plantation both in the hills and in the Dhoon, such as Kangra and Deyrah, the first object of attention—the nature of the soil—having been ascertained; the sight or exposure being of little consequence, is a fence, the black-thorn or *cratregus*, in the former, makes an excellent one, and it also, when thinned, gives excellent handles for implements. Bamboos too form excellent fences, and as they abound particularly in the Dhoons, they ought to be extensively used, particularly in the Kangra Valley and Deyrah Dhoon, as from them, by judicious thinning, the supplies for the factory for making baskets, &c., may be obtained. The first thing to be done is to dig a trench to prevent the straying of cattle and the depredation of wild animals, as wild hog and deer which abound, and though they do not eat Tea leaves, yet wild hogs in search of tubers will, in the space of a single night, do much damage by uprooting young shrubs. On the trench being dug, and the fence made, all useless trees and shrubs are to be

Fencing.
Black thorn well fitted.
Bamboo good.

removed, as the Tea plant will not thrive if there is much shade. This is heavy work, but absolutely necessary to be done. Here and there a few trees ought to be left to afford shade to seed beds. All the timber cut down is to be carefully collected and stacked, as it will prove highly useful afterwards for making boxes, fuel and charcoal, building servants' houses, &c. Let the roads be then marked off.

Draining.

After this let the land be properly drained by open drains. Under drains will not, on account of the expense, be practi-

cable in this country.

Let the ground be first ploughed and then trenched with the phowrah or Indian spade to a depth of at least 2 to 3 feet, remove the weeds by means of the large two or three-toothed fork. This implement, will be found highly useful in removing weeds and pulverizing the soil. In the hills, in many places, neither the plough nor phowrahs can be used owing to the steepness of the declivities and the number of stones. The kootlah, will, in those places, be found highly useful. The kootlah consists of a flat or pointed piece of iron of about 8 inches in length and slightly curved. When used it is fitted into a wooden handle. The hill people employ it extensively; but owing to its only going a few inches into the ground, it is not to be commended unless in weeding, when it is highly useful, particularly in stony soils.

Trenching.

Formation of roads and paths.

Let two or three roads of 10 feet broad be made through the Plantation, and let them be joined by others of 6 or 8 feet. The roads are highly useful, keep the place neat, and allow air to circulate freely through the Plantation. Divisional plant beds ought not to be broader than 40 or 50 feet, and at this distance a six feet road ought always to intervene, in order that the planter may be able to see well the state of the plants, and that air may circulate freely. If a Plantation be formed in the Deyrah Dhoon, the roads will require to be wider, say 10 to 12 feet, to enable the weeds to be carted away to the different places set aside for manure pits.

CHAPTER III.

On the time of flowering of the Tea plant, seeds when ripe, and method to ascertain it.

The Tea plant begins to flower about the end of August and beginning of September, and the seeds ripen about the 1st of October of the following year. All the plants do not come into flower at once; but some are in flower in September, others in October, November, December and January. Some throw out a second set of flowers in March, April and May, and during the rains, so that from the same plant unripe and ripe seeds and flowers may be collected at one and the same time. The seeds are contained in a capsule, and vary in number from 1 to 7. To ascertain that they are ripe, open the capsule, although green, and if their colour is a nut brown, they are sure to be ripe. If they are not ripe they are of a reddish, brown colour mixed with white. If the seeds are allowed to remain on the bushes, for a

short time after they are ripe, the capsules burst, and they fall out. It is necessary, therefore, to remove them before this takes place. At present, as stated, the first gathering of seeds takes place on the 1st October; but as numbers of them do not ripen until November, another gathering ought to take place about the end of that month.

On the method of sowing seeds, and season, and on the treatment of young Tea plants after they have germinated.

The ground having been well trenched and manured, viz. 80 to 100 maunds, or 3 to 4 tons per acre, remove the seeds from their capsules, and let them be sown in drills 8 to 10 inches apart from each other. The sooner the seeds are sown after they are removed from their capsules the better, as their germinating properties are apt to be destroyed if kept for any length of time. If they are kept until February and March, not more than 50 per cent will germinate, and if kept till April not 5 per cent. Some germinate in a few weeks, others lie dormant until February and March, and many do not germinate until the rains. A large quantity of seeds were received from China at different times. On one occasion twelve large boxes were received in July, but not one germinated. Many parcels, on arrival in Calcutta, were sent to the Plantations by letter dawk; but only 150 out of some thousands of seeds germinated, showing that the Tea seed does not keep its vitality for any length of time. As soon as the seeds begin to germinate in February and March, they will receive much advantage by being irrigated, and this may be repeated every three weeks, if rain does not intervene; but irrigation is not essential, as in many of the Government Plantations seeds are sown which cannot be irrigated. The advantage attending irrigation in promoting their germination is considerable.

Treatment of young plants after they have germinated.

Young small seedling plants stand cold badly; if, therefore, many germinate in November, they ought to have a top dressing of manure, and be protected by a chupper or mat made of bamboo or branches and grass, and during the day, when the sun shines, the chuppers ought to be removed, and again replaced at night. In the Plantations whose altitude is low as in the Deyrah Dhoon, chuppers are also highly useful to cover the seedlings during the heat of the day, particularly in the months of April, May and June, and until the rains set in. At all altitudes above 4000 they are not required, and are in a manner useless. If mats or chuppers are not used in low localities, the young plants acquire a sickly yellow colour and are weak, and when the hot weather sets in are soon burnt up by the sun. If chuppers be used to cover seedlings in the hot weather, they ought always to be removed at 4 P. M. and re-placed at 8 A. M. When the seedlings are observed to be very stunted and grow slowly, they will be at once benefitted by weeding and having a top dressing of manure and irrigated. By doing so I have frequently seen some small plants in six weeks or two months become fitted for transplanting.

Top dressing of manure when required.

Weeding of seed beds.

This operation is to be done carefully with the weeding iron. As soon as the

young plants are three inches high they ought to be weeded, as if weeds are allowed to remain they draw them up and thus make the plants thin and weakly. It matters not though the weeder, in removing weeds, disturbs seed germinating, as they can easily be put into the ground again. Moreover, the advantage given to the young plants by opening up the soil around them, is great, and much more than compensated for the injury done. Monthly the young plants ought, therefore, to be weeded. After weeding let the mats or coverings be re-placed in order that they may not be injured by the heat of the sun.

Method of raising Plantations by layers and cuttings.

The best season for laying down layers is in the month of February, when the sap is beginning to rise, and when in full action, as during the rains. Laying, as expressed by Doctor Lindley, is nothing but striking, from cuttings, which are still allowed to maintain their connexion with the parent plant by means of a portion of their stem. There are various methods of making layers; but the most simple and efficient is to bend down a branch, and sink it into the earth after having made a slit or notch in the centre of the embedded portion. By so doing the descent of the sap is retarded, and thus the formation of radicals or young roots is promoted. About six or seven inches or more of the branch is to be allowed to remain above ground and in a position as perpendicular to the point where the plant is notched as possible. If put down in the cold weather the layers will be ready to transplant in about twelve months or the ensuing season; but their removal is to be gradual, that is, they ought to be cut through half, then two-thirds, and finally separated altogether.

Rearing plants by layers not satisfactory.

This method of rearing plants is unsatisfactory and not to be generally recommended, and the plants are not nearly so good as those procured from seeds.

The best time to put cuttings a tedious process of rearing plants.

in cuttings is from November to February, or during the rains. It is necessary to protect them from the frost in the cold weather, and from the heat in the hot weather, by mats or chuppers. Cuttings put in during the cold weather will not be ready to transplant before the rains of the second season, and even then they do not form strong bushes for many years. I therefore would not recommend the process to be extensively adopted.

CHAPTER IV.

On the method of transplanting and season.

On transplanting young Tea bushes, care must be taken to lift them with a good large ball of earth attached to their roots, as they throw out a long central or top root, which, if cut through, either destroys the plants, or renders them very sickly for a considerable time. They also throw laterally numerous small rootlets, all of which ought not, if possible, to be cut. If the plants are to be carried to a distance, it will be necessary to tie them up in grass to prevent the earth falling from their roots, and to use the hand-barrow. The best season for transplanting is during the rains, or from July until September. January and February are also favorable months, provided rain falls. If,

Season for transplanting.

however, transplanting be conducted during the rains, no irrigation whatever will be required. If, however, transplanting has been carried on in February, and the weather becomes hot and dry, it will be necessary to water the newly transplanted plants until the rains set in, and this can be done by the gardeners with vessels filled with water. This, however, adds much to the expense of the Plantation, and ought to be avoided by confining the planting to the rains. Moreover, during the month of

Beetle destructive to young plants.

February, a small beetle—a species of *cetoma*—commits great ravages amongst the small and newly-planted plants, particularly if any be weakly and sickly. On examining the ground at the roots of the plants whose leaves have been much cut, a number of small holes will be perceived, and on opening up the soil and tracing these a number of small beetles will be found. I have frequently got as many as two and twenty beetles at the roots of a single Tea plant, and last season nearly a bushel was collected. The only way to eradicate them is to collect them and destroy them with boiling water. For this purpose, as soon as the beetles show themselves in the Plantation, I appoint a party to collect and destroy them. Twice daily the large vessels in which they are collected are brought to the overseer, and before him the beetles are destroyed by boiling water. They never attack a strong healthy plant, but confine their ravages to newly transplanted plants, and they are only met with on the setting in of the hot weather. Transplanting, therefore, ought, if possible, to be avoided during the spring. In its habits the beetle is nocturnal, and thus frequently commits extensive ravages before it is discovered. In the Deyrah Dhoon and Kangra Valley rats in burrowing commit great havoc by gnawing the roots of the Tea plants by trucking and keeping the land clear. They are, however, soon forced to leave the Plantation. If water be available, by flooding the land they can easily be destroyed.

How destroyed.

For transplanting, in order to economise labor, the men ought to be divided into five gangs;—the first, to dig holes to receive the plants; the second, to dig the plants; the third, to carry the plants; the fourth, to plant the plants when brought; and the fifth, to bring manure. By thus acting, both time is economised and the plants are much better planted. In removing the plants from the seedling beds, care, as already stated, is to be taken not to cut the top root, and if two or three plants or more have their rootlets entwined, it is much better to put them all into one and the same hole, than attempt to separate them, and thus injure their rootlets. On doing so, let them be well pressed down with the foot, and watered to settle the earth round the plants.

Manuring.

Into the hole into which the plant is to be put, let a small basket-full of manure be thrown, as it is quite necessary to give them manure. If it be not given, and the young plants be removed from strong well-manured land to poor soil, they remain stunted and do not progress for years. On the other hand, by manuring them well when they are first transplanted, they grow rapidly, and in the third year form strong and healthy bushes.

Manure pits ought to be formed in convenient places throughout the Plantation, so that it may not be necessary to bring it from a distance and thus increase the labour, and all the weeds ought to be thrown into these pits. In addition to the seedling plants, all the plants throughout the Plantation ought to be manured twice annually, viz., in spring and in June, or when the first crop has been taken away.

Height of plants to be transplanted.

Young seedling plants ought not to be transplanted until they are 8 inches high; all above this height are well fitted for the purpose. In transplanting let the plants be placed $3\frac{1}{2}$ to $4\frac{1}{2}$ feet apart in

Number of plants per acre.

straight lines, as by so doing it simplifies the gathering of leaves afterwards. If the land has a considerable declivity, the plants must be placed horizontal to the dip, as if this is not done, the earth is liable to be washed away from the roots by the heavy rains. Such kind of land abounds in Kumaon and Gurhwal, and is well fitted for Tea provided that this be attended to. Transplanting at $3\frac{1}{2}$ or $4\frac{1}{2}$ feet apart will require 3556 or 2151 plants to the acre. But, as stated, in removing young plants from seedling beds, it is much better to put two or three seedling plants into one and the same hole than injure them by attempting to separate them when transplanting, as a good-planted and well-manured piece of land will in less time give a greater return than a large tract badly planted. We may, therefore, estimate 5000 plants to the acre. Manuring plants, when planted, is of the utmost consequence, and ought to receive the greatest attention, and never be neglected, provided it be the wish of the planter to see his Plantation progress with rapidity. It is much better, in my opinion, to plant thickly and thin afterwards than to plant widely, as the planter can by so doing select the plants to be left to form his Plantation. If the seedling beds be very large, plants ought to be left at a distance of four feet apart, and thus save labour.

Thick Plantation recommended.

Sowing seed in four feet drills.

Some parties, in order to save the trouble of transplanting, sow seeds in drills four feet apart. This method I have tried extensively; but the results attending it have always been such as to prevent my recommending it to be pursued, the plants always remaining stunted, caused, no doubt, by exposure during the first months of their growth, as it is impossible to protect them, when young, from heat and cold.

On Irrigation.

In my former Report, I have recommended that plants be irrigated for two or three years, or until they have taken hold of the ground. This, I now find, from most extensive practice, unnecessary, unless in seasons of drought, and even then it is quite unnecessary unless to the smallest and weakly plants. In the hills for three seasons there has been a drought, and but little rain has fallen in the cold weather, causing the entire destruction of several crops. In the irrigated Tea plants no bad results have ensued, barring some of them not looking so healthy as they ought to do, proving the value of this cultivation to the Himalayas. The returns, too, of leaves have been

Drought in the hills, and results.

good average ones. If, however, as stated, transplanting be carried on in the months of January and February, and hot weather ensues, it will be absolutely necessary to water the young transplanted plants with gurrals, or watering pots, and thus considerable labour and expense are incurred, which can be avoided

Irrigation not necessary. by confining the transplanting to the rains. During the rains it is not at all necessary to water the transplanted plants. If irrigation is available, it will be found highly useful for seed-beds; but

When useful. to no other part of the Plantation is irrigation required. That such is the case is highly important, as there are immense tracts of waste unirrigated land in the Himalayas well-fitted for Tea cultivation and available in almost every District. These lands, however, must be planted during the rains; and, as a general rule, I would strongly recommend that transplanting be confined to this season.

CHAPTER V.

Plants when ready for yielding leaves.

Until the third year no leaves ought to be gathered, and then the gathering ought not to commence until the rains set in, in order to allow the bushes to attain a good size. If the plants send out long leading shoots in the second year, these ought to be nipped off with the thumb and fore-finger, in order to induce the plant to throw out lateral shoots, and thus assume a basket form, the best for yielding leaves. But this ought not to be extensively done, as it stunts and dwarfs the bushes. If the leaves be not gathered until the fourth year, the bushes become scraggy and yield but few leaves. If the weather has been very moist, and the land strong on which the plants are growing, long shoots are produced which ought to be nipped off to keep the bushes under. These shoots, at the end of the rains, ought to be still more shortened with the knife. When gathering the leaves, the succulent stem to which the four upper leaves are attached ought to be nipped off with the thumb and fore-finger along with the leaves, as it adds to the aroma and strength of the Teas.

Method of gathering Tea leaves.

The season for gathering leaves generally commences about the beginning of April, and continues until October; the number of gatherings varies depending on the moistness and dryness of the season. If the season be good, that is to say, if rain falls in the cold weather and spring and the general rains be favorable, as many as five gatherings

may be obtained. These, however, may be reduced to three general gatherings, viz., from April to June, from July to 15th August, and from September to 15th October. If the season be a dry one no leaves ought to be taken off the bushes after the 1st October, as by doing so they are apt to be injured. If, however, there are good rains in September leaves can be pulled until the 15th October, but no later, as by this time they have got hard and leathery and not fitted for making good Teas, and as it is necessary to give the plants good rest in order to recruit. Some plants continue to throw out new leaves until the end of November; but those formed during this month are generally small and tough

The following is the method adopted in gathering leaves.

A certain division of the Plantation is marked off, and given to a head man, or chow-



FIG. 1.

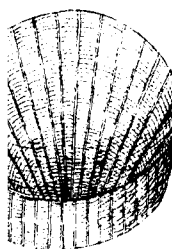


FIG. 2.

Chinese assist in gathering
ves.

dre, with thirty men. To each man a small basket, (Fig. 1) is given, with instructions to proceed to a certain point and down certain rows of bushes, so that no plants may be passed over. The small basket hung in front of the gatherer by a suspensory band from the neck with both hands, the younger fresh leaves are gathered, and if the terminal shoots are soft and succulent, they are disposed of with the thumb and fore-finger along with the two upper leaves, these shoots being highly prized as giving both strength and aroma to the Teas. On the small baskets being filled, they are emptied into another larger one, (Fig. 2) which is kept in a shady place, and it, when full, is conveyed to the factory. All old leaves are rejected, as they will not curl, and therefore useless and unfitted for making Teas. The Tea-gatherers, as stated, are divided into gangs, a chowdry or head man, being appointed to each party, to look after them, and prevent new hands from gathering any thing but new fresh leaves; and the Chinese Tea manufacturers also work with the men, directing them how to gather, when not otherwise engaged the factory. It will be the duty of the planter to be amongst the gatherers as much possible, in order that he may constantly examine the kind of leaves collected, as if is be not done, natives will always collect old leaves, as well as new and fresh ones, and thus cause much second class Teas to be prepared. The

Weighing leaves.

leaves, on being delivered at the factory, are weighed, and then spread out on mats or flat baskets. It is of consequence to weigh them in order to ascertain the yield, but also the work of the men under the chowdries. At the end of the day the quantities brought in by each gang under a chowdry are ascertained, and it is then seen what parties have been neglectful of their work. Thus, a man accustomed to gather leaves, will collect in a day £12 to £16 of Tea leaves, provided he does his duty and leaves are abundant, and thus a gang of thirty men will bring into the factory from £300 to £480 per diem. This is the only week that the overseer has when working a large body of men. Paying for good fresh leaves, as gathered from private Plantations brought to the factory, is also a good and economical plan, and one which ought to be followed if the cultivation be extensive, and the price at present paid by Government is Rupees 8, or 16 shillings per hundred of £80. The gathering of leaves is a very simple process, and thus women and children can be employed in the work. It has been frequently stated that certain kinds of leaves are required in order to prepare different kinds of Tea. With the more rare varieties this is no doubt correct; but with those most common in the

Purchasing fresh leaves recommended. Price paid.

2

Table showing the yield of Tea by 100 full-grown plants in 1855.

PLANTATION.	QUANTITY OF RAW LEAVES.													
	April.	May.	June.	July.	August.	September.	Total.	Total of Tea made.						
<i>Deyrah Dhoon.</i>	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.
Kaoligir ..	24	4 1 12	0	0	30	11	17	0	12	0	85	11	22	13
<i>Kumaon.</i>														
Hawulbaugh ...	22	3 14 0	2	0	11	12	23	2	5	0	78	1	20	9

No. 1.

Detailed Return of the quantity of Raw Leaf gathered monthly from the Government Tea Plantation, Kaoligir, Deyrah Dhoon, in the year 1856.

DATE.	1st Divi- sion.	2nd Divi- sion.	3rd Divi- sion.	4th Divi- sion.	5th Divi- sion.	6th Divi- sion.	7th Divi- sion.	8th Divi- sion.	Honse Garden.	China Plants.	100 Trees.	From Ze-Monthly mandars. Total.
From 2nd to 26th April	4705 4	1322 0	1044 8	1652 8	1781 8	659 8	1221 0	1331 0	2319 0	135 0	31 0	1 0 16403 4
From 17th to 30th June	3955 2	1218 3	1472 4	1710 13	3652 14	702 13	1024 9	1932 6	5444 0	487 14	33 8	23 8 21657 14
From 1st to 31st July	1118 0	376 0	846 0	911 8	610 8	76 0	401 8	451 0	1275 4	0 0	6 0	0 0 6041 12
From 1st to 29th August	1654 0	581 0	756 0	546 0	1202 0	323 0	499 0	670 0	1482 0	139 0	5 0	0 0 7857 0
From 6th to 10th September	1626 0	309 0	637 0	262 0	567 0	210 0	223 0	617 0	1580 0	89 0	6 0	0 0 6126 0
From 6th to 13th October	1159 0	198 0	194 0	119 0	417 0	63 0	137 0	344 0	565 0	0 0	0 0	0 0 3196 0
From 16th to 28th October	158 0	59 0	52 0	67 0	95 0	13 0	56 0	71 0	51 0	57 0	0 0	0 0 679 0
Total	14375 6	4003 3	4671 12	5368 13	8325 14	2047 5	3563 1	5410 6	12946 4	907 14	81 8	24 8 61060 14

No. 2

Table showing the quantity of Tea manufactured in the Government Factory at Kauligir, in the Deyrah Dhoon, during the year 1856.

Date of Manufacture.	GREEN TEAS.										BLACK TEAS.										Total of Green & Black Teas.												
	Gun-powder.		Imperial Gunpow. det.		Hyson.		Young Hyson.		Picked Hyson.		Total of Fine Teas.		Sum at Hyson.		Total of Second Class Teas.		Grand Total.		To keoc.			Fine Sou. chong.		Son. chong.		Ton. chong.		Total of 1st Class Teas.		Bohea or 2nd Class Teas.		Grand Total.	
	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.		lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.
PRODUCE OF PLANTATION.																																	
1856.																																	
From 2nd to 26th April																																	
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From this Table it is shown that a Plantation consisting of 1500 full grown plants per acre will yield, if in good order, lbs.300 of Tea per acre. The Table also shows that the first and second crops of leaves are about equal, and the third equal to about a third of the others. These proportions, however, depend much on the state of the seasons, i. e., on the fall of rain. To bring about such results requires high cultivation. A portion of the Deyrah Dhoon Plantation, which has been highly cultivated, is now yielding Tea at this rate, and the land there is not better fitted for Tea cultivation than many other places in the same valley, and in the Himalayas in Kumaon, Gurhwal and Kohistan of the Punjab.

Yield of Tea Leaves and Teas at the Government Plantation, in the Deyrah Dhoon, in 1856.

No. 1. This Table shows the whole quantity of leaves gathered in the Government Tea Plantations last season, amounting to lbs.61,960 14oz. It is interesting as showing the proportion of Teas yielded by a Plantation at different seasons of the year. Thus it shows that the first crop gathered is the greatest; but this crop is liable at times to be destroyed by hail-stones. Last season, owing to Cholera having broken out in the establishment, (and thus the want of hands, as parties were afraid to come near the Plantation,) the rain crop of leaves is less than it ought to have been. The whole out-turn of Tea was lbs.16,022 4oz. The leaves of the first crop always yield more Tea proportionally than those of the rainy crop, as they contain less moisture, and therefore lose less in manipulation. As a general rule no leaves ought to be collected when it is raining, as Teas prepared when the leaves are very moist are both inferior in quality and weak. It, however, at times cannot be avoided, as when leaves are very abundant and rain incessant, leaves brought into the factory when it is raining ought not to be weighed for some time, or until they have lost in quantity and their moisture, if proportional results as to the quantity of Tea yielded are looked for.

In the Table appended, the quantity of leaves yielded by each division is given in order to show the value of high cultivation. Thus, the house garden, consisting of twelve acres, is cultivated at the rate of one man per acre, and by it lbs.12,916 of leaves were yielded, and as leaves yield Teas in the proportion of four to one, or four pounds of raw leaves to one pound of Tea, the out-turn of Tea per acre by high cultivation was rather more than lbs.300 per acre, and this too on land the cereal crops of which cannot compete with those of the plains.

In Table No. 2 we have shown the yield of Teas from the raw leaves by the Canton Price Plantation, which shows a yield of rather more than one of Tea to four of leaves. But, as a general rule, it may thus be given.

CHAPTER VI.

On the method followed by the Canton men in manufacturing black Teas.

The young fresh leaves, on being picked, are carried to the manufactory, and spread out on mats or flat baskets in a large airy room to cool, and are there kept during the night, being occasionally turned with the hand if brought in the afternoon, or if brought in during the morning, they are allowed to be until noon. Early in the morning they are packed up in baskets by the manufacturers, and removed into the

manufacturing room. Each manufacturer takes a basket-full, and commences to beat them between the palms of his hands, and with a lateral motion, (Fig. 3.) in order to soften them and make them more pliable for working, and thus prevent them, when rolled, from breaking. This beating process continues for about an hour, and it may either consist of one or two processes,—that is, the Chinese some times finish the beating and rolling process at once; at others, they allow the leaves, after being beat and rolled for

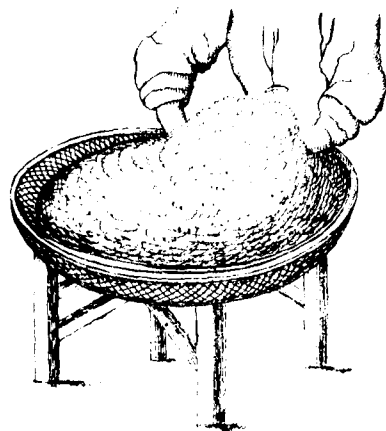


FIG. 3.

half an hour, to remain a time, and then resume it. This process is called *withering*, and when the leaves are ready, they are soft and pliant, and of a reddish brown colour. If the leaves are prepared by this process into Tea before they are properly withered, the Teas will have a semi-black

Withering leaves.

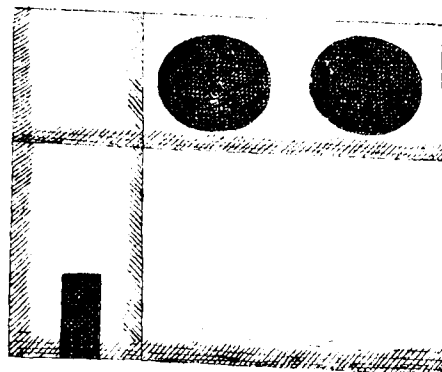


FIG. 4.

colour. Such kind of Teas are frequently met with in the market. This colour, however, is not uniform, some being partly brown and partly green. They now go to breakfast, and in an hour and a half the leaves are ready for the pan. The pans, being heated by wood placed in the oven, (Fig. 4) so as to feel hot to the hand, are filled to about two-thirds; or about three seers of leaves are thrown in at a time,—the



FIG. 5.

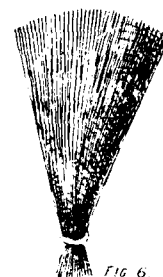


FIG. 6.



FIG. 7.

quantity which a manufacturer is capable of lifting with both hands. When thrown into the pan the leaves emit a crackling noise, and much moisture in the form of steam is disengaged. With the hands the leaves are kept moving with a rotatory motion in the pan, and when they become very hot, the motion is kept up with a pair of forked sticks, (Fig. 5.) To regulate the heat of the pan, one of the manufacturers remains at the door of the oven to remove fire, or add more wood, as required. This process is continued for three or four minutes, depending on the heat of the pan, or until the leaves get hot and soft. They are then, with one sweep of a bamboo brush, (Fig. 6) swept into a basket, (Fig. 7) and thrown on to the rolling table, which is covered with a coarse

t made of bamboo. (Fig. 8.) In removing the leaves from the pan great care must

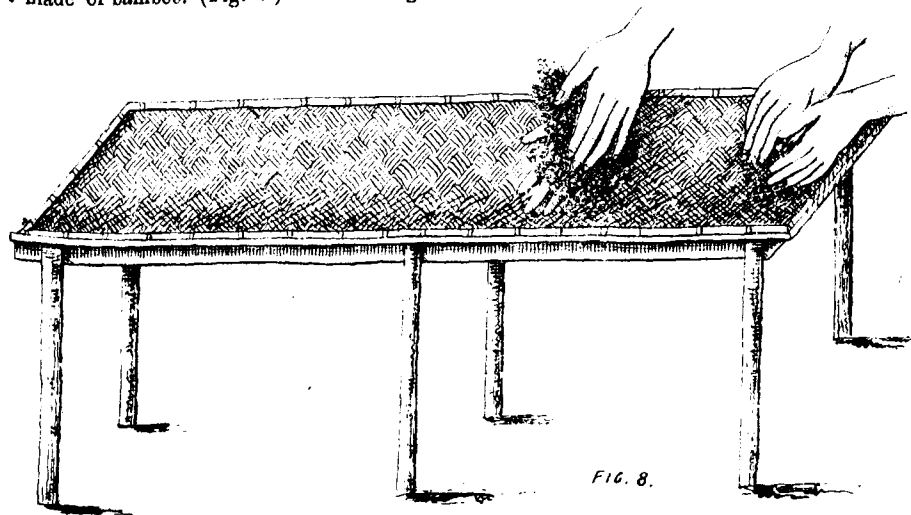


FIG. 8.



FIG. 9.



FIG. 10.

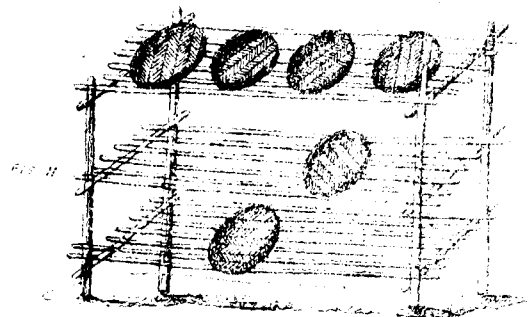


FIG. 11.

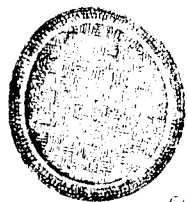


FIG. 12.

be taken not to leave a single leaf in the pan, as by doing so the aroma of the Tea may be affected. Each manufacturer then takes as much as he can hold in both hands, and forms a ball, (Fig. 9) and commences to roll it with all his might, with a semi-circular motion, (Fig. 10) which causes a greenish yellow juice to exude. This process is continued for three or four minutes, the balls being occasionally undone, and made up again. The balls are then handed to another party at the extremity of the table, to undo them and spread the leaves out thinly on flat baskets, and expose them to the sun, if there is any; if not, they are kept in the manufactory and put on frames. (Fig. 11.) After all the leaves have gone through this process the first baskets are brought back, and the leaves again transferred to the pan, worked up in a similar manner for the same length of time, re-transferred to the table, and again rolled. This being done, the leaves are again spread out on large flat baskets, (Fig. 12) to dry, and put away on frames. On being cooled the leaves are collected together and thinly spread out on flat wicker-worked,



FIG. 13.

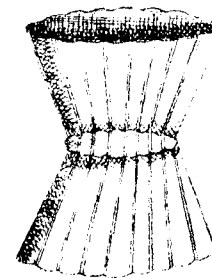


FIG. 14.



FIG. 15.



sieve baskets. (Fig. 13) which are placed in others of a deep and of a double coned shape. (Fig. 14.) The choolahs being lighted for some time and the charcoal burning clear, they are now ready to receive the coned baskets. The double basket is placed over the choolah, (Fig. 15) and kept there for about five minutes. The leaves are then removed, re-transferred to the flat baskets, and re-rolled for a few minutes. This being done, the leaves are again brought together, placed in the conical baskets, and kept over the charcoal fire for about two minutes. The contents of the conical baskets are then all collected together in a heap, and as much is placed in a conical basket as it will hold, and it is again placed over the charcoal choolah, which is made very slow and retained until the Tea is perfectly dry. If the choolahs are burning too freely, a small quantity of ash is placed over the charcoal. Great care must be taken that no smoke is emitted by the charcoal. During this time the baskets are frequently removed, and the Tea turned in order to allow the Tea to be completely and uniformly dried; and the basket too is generally

struck, on removal, a violent side blow with the hand to remove from the meshes of the sieve any small particles that might otherwise fall into the fire before it is again placed on the choolah. Before removing the basket from the choolah, a flat basket is always placed on the floor to receive it, and all the particles which pass through on the coned basket being struck, are again replaced. On the conical basket being filled, before placing it over the choolah, a funnel is made in the centre of the Tea with the hand, to allow the heated air to pass through. Some times a funnel made of bamboo, (Fig. 16) is made for this purpose, but it is not much used. After the Tea feels perfectly dry, it is packed in boxes while warm and sent to the godown. When the manufacturers have leisure, the different kinds of Tea are



FIG. 16.

picked with the hand, and, on being separated, they are again placed in the conical baskets and heated over a very slow charcoal fire. During this process the baskets are frequently removed from the choolah in order to turn the Tea, so that the heating may be general and uniform. In doing this a flat basket is always placed on the floor, as on the former day, (and a flat basket too is placed on the top to confine the heat) to receive the conical one, which receives one or two blows to open the meshes of the sieve. What passes through is re-placed amongst the Tea; when it is perfectly dry, it is ready for finally packing.

On the method of preparing black Teas followed by the Chinese lately arrived from Foo-choo-foo.

On the leaves being heated in the pans, they are transferred to the table, and rolled as mentioned above. They are then transferred to the Chinese in balls, who roll them on flat baskets with their feet. (Fig. 17.) By this process the

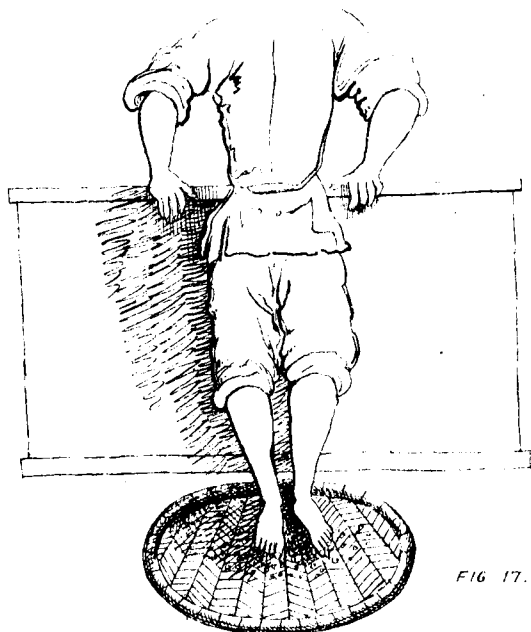


FIG. 17.

juices are better extracted. After being rolled with the feet the leaves are then, as in the former case, spread out thinly on flat baskets, and exposed to the sun for an hour, and then transferred to the sieves and placed in the double coned baskets to dry. This is done over the choolahs heated with charcoal, and on which a considerable quantity of ash has been thrown to lessen the heat. It is then gradually dried, and, when ready, packed in boxes and sent to the godown.

Process of black Tea making by the Chinese from Kiang-si.

This process of making black Teas is quite different from any of the other, and I am convinced that the black Teas prepared by them will prove to be of a very superior description. By them the leaves undergo the heating process in the pan as mentioned. This being continued for two or three minutes, they are divided into small heaps. Each manufacturer then takes his position in front of a range of pans, as in Fig. 18. The leaves

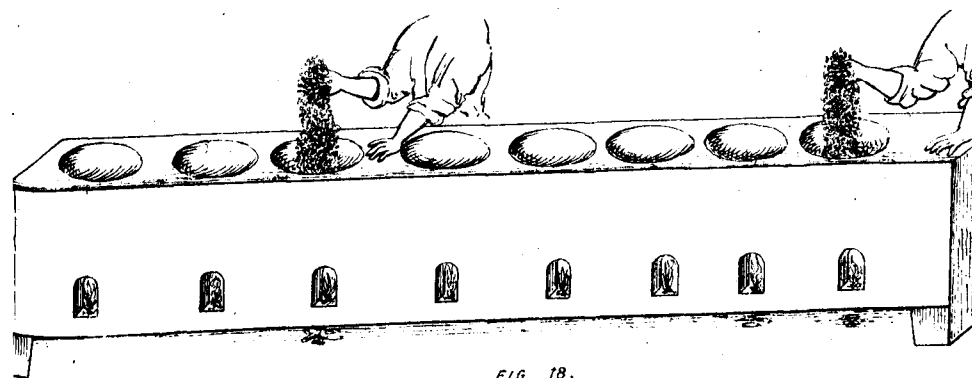


FIG. 18.

are then rolled in No. 2 pan, which is quite cold, for a short time, and then transferred to the party stationed at No. 3, by whom the ball is broken up and re-rolled. From No. 3 it is transferred to No. 4, and thus the work is carried on from pan to pan, at each pan the ball being broken up and again re-rolled. From No. 8 the leaves are again brought back in balls to No. 1 re-broken and again re-rolled in all the pans. It

then spread out very thinly on large flat baskets, which are placed on frames, (Fig. 19)

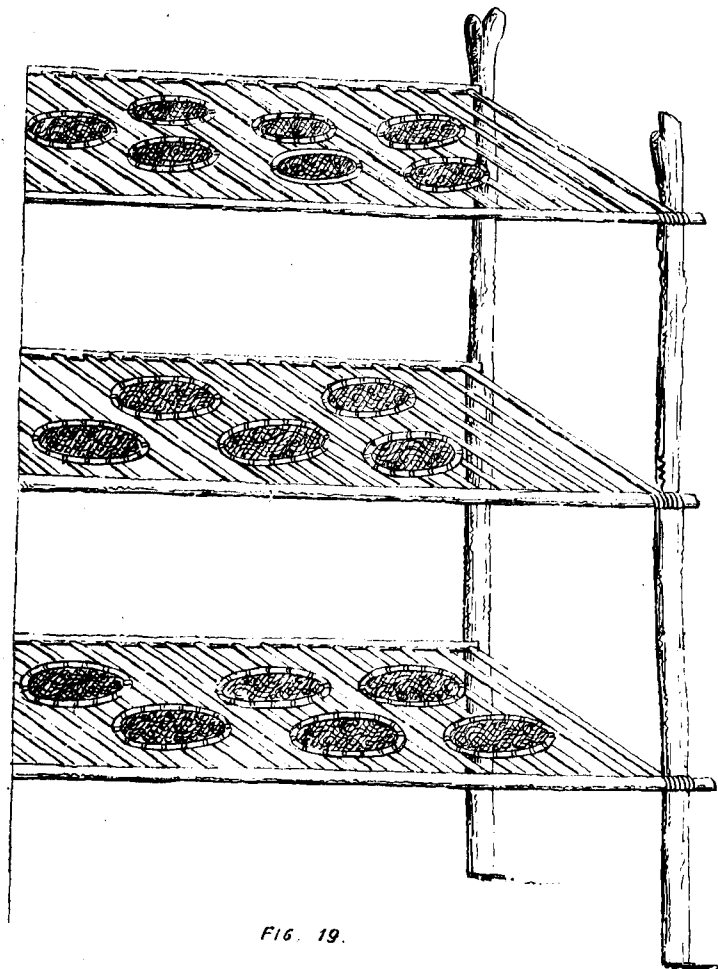


FIG. 19.

and dried in the sun, or, if there be no sun, the frames are placed in the verandahs. The length of time that the leaves are thus kept depends on the weather. If the sun be powerful, an hour is ample; on the other hand, if the weather be cloudy, from two to three hours are required. Being thus dried it is then transferred to sieves, which, as in the former cases, are put into the conical baskets and placed over the choolahs filled with charcoal, over which a thick coat of ash has been placed to lessen the heat. Owing to the heat being so very slow the Teas are kept in the baskets from six to eight hours. The preparation of Teas in this manner, is, I think, a great improvement, and one which ought to be generally followed, provided that the samples about to be sent to England meet with the approval of the Home brokers, as when natives are extensively employed in the factories, they are liable to over-heat and over-dry the Teas through carelessness when the choolahs contain live charcoal. This no doubt caused the Home

brokers to state that some of the samples sent home had a burned flavour; moreover, by rolling the Teas in the pans the leaves are much less liable to be broken, and all the juices being preserved and mixed with the leaves, the colour is much more uniform and the strength of the Teas increased. I have stated that only No. 1 is heated with wood. If, however, as during the rains, the leaves be very moist, and a large quantity of juice exudes, all the other pans, Nos. 2, 3, 4, 5, 6, 7 & 8, are slightly heated to drive off the moisture. The kinds of Teas prepared in the factories by the above processes are Souchong and Pouchong and Bohea.

Congou Teas how prepared.

The following is the method followed in preparing Congou Teas. The leaves, being brought into the factory, are worked up or withered in the same manner as for other black Teas. They are then rolled on the mats without being heated in the pans. Each rolling party, if there are eight or ten men at the table, breaks up the ball on being passed to him, and re-rolls it; and on reaching the last of the party, after rolling it, it is made up into a firm ball, about twice the size of a man's fist, by two men, and then laid on a flat basket. As soon as a sufficient number of balls have been obtained to fill the basket, it is removed to the open air, and exposed to the sun to dry for an hour. By this time the balls have assumed a reddish brown colour, and are now broken up and scattered over the surface of flat baskets, and again exposed to the sun. When the leaf is nearly dry, it is again taken to the factory, and put into the green Tea or inclined pans, which are gently treated with wood. Into each pan from lbs 12 to 14 are thrown, and the mass is carefully and gently moved up and down, turned over and compressed against the sides. This process is continued about an hour; it is then put into bags made of strong American drill, and again compressed with all the strength of the manufacturer. The leaf having been compressed into a hard mass, it is now rolled in a flat basket placed on the floor for the purpose, the manufacturer standing on it, and holding the table or any thing else for support. This rolling of the Teas in bags is continued for half an hour. The Tea is now taken out of the bags, placed on sieves which are put into the conical baskets, and then slowly finally dried over choolahs heated with charcoal to deaden the heat.

Flowery Pekoe how prepared.

In preparing this Tea it is necessary to gather the leaves separately, as it consists of small buds before the leaves have expanded. Before the season, therefore, for making Teas generally commences is the best time to obtain a good crop of this kind of Tea. During the rains or early in September is also a good time.

Method of preparation.

On the leaves being brought to the factory, they are thinly spread out on large flat or sieve baskets, and exposed to the sun. If the sun is high, the leaves are exposed from 15 to 20 minutes, and if the weather be cloudy, they are exposed for a corresponding length of time. They are then brought into the factory and allowed to cool. The contents of two or three baskets are now mixed together and again exposed to the sun and air after being covered with a flat basket for an hour or one and a half hours.

At the end of this time the leaves have become very dry, six or more small baskets or sieves are now brought together, and put in a large flat basket and allowed to remain in the sun until it appears to be well dried. It is now placed on sieves which are deposited in the conical baskets, and placed over the choolahs in which there are very slow charcoal fires, it being made slow with charcoal ash. The conical baskets are filled with Tea, and inverted cones made in the centre with the hand in order to allow the heated air to pass through. To confine the heated air, it is now covered with a flat basket. Over the choolahs the Tea is allowed to remain eight or ten hours. In making Pekoe Tea, the leaves are in no instance rolled, and the only firing it receives is when finally dried and packed. Nor does it require much picking if the fresh leaves have been carefully plucked. Any leaves that may have expanded in the drying process

Flowerly Pekoe whence named.

are removed with the hand, and the Tea is then fitted for packing. Flowerly Pekoe is so named from the ends of the Tea being of a white colour and its aroma high, caused, as

stated, from this Tea being made of the unexpanded buds.

The first crop of black Teas having been prepared, and no more fresh leaves available, the manufacturers now commence to separate the Teas into different kinds. This is principally done by hand-picking—a tedious process, at which natives are very expert, and which is quite suited to

Picking Teas.

their habits. The kinds into which the Teas are divided are Souchong, first and second quality; Pouchong, first and second quality; Bohea; all the coarse, half curled and badly coloured Tea leaves form this last kind of Tea.

Kinds of black Teas prepared.

Scenting black Teas.

This work forms the duty of particular parties, and from China Tea-scenters have been imported by Government. The following is the process followed by them. A quantity of flowers was collected from the following plants—Gardenias, Oranges, Jasmine, Rose, &c.; each kind, being kept separate, were mixed with Teas in the proportion from 10 to 20lbs. of flowers to 50lbs. of Tea, and placed on a sieve which was inserted in a conical basket. This basket was then placed over a slow charcoal fire, and there retained for twelve hours. The flowers were then removed by sifting through sieves. If the Teas are not sufficiently scented they again undergo the process. The Teas are then ready for packing, and the scent, though faint at first,

Flowers of plants used.

becomes stronger by being kept. The following plants are admirably adapted for scenting Teas, and are met with in

abundance in India:—

- 1 Gardenia Florida.
- 2 Gardenia Lucida.
- 3 Jasminum Sambae.
- 4 Jasminum Grandiflorum.
- 5 Jasminum Officinale.
- 6 Rosa Damascene (Rose-water Rose.)
- 7 Rosa Damascena.
- 8 Rosa Moschata Annaminea.
- 9 Olia Acuminata.

This Olive is a species nearly allied to the Olia Fragrana, and is admirably adapted for scenting Teas. It abounds in many places in the Himalayas. The Champa, too, might be thus employed, as also the Magnolia Juscata. Of the Orange tribe there are a number of species available which might be thus usefully employed. We have mentioned some species of Jasmynes; but there are many others which might be equally well employed.

The Teas being separated into different classes, they are again carefully heated over a very slow charcoal fire one or two hours, and when still warm, packed.

Packing of black Teas.

As soon as the Teas are ready for packing, the sheet lead boxes, which have been carefully covered with paper, in order to fill up any holes that may exist in the lead, and thus prevent the Teas being injured by exposure to the air, are deposited in the wooden boxes, and the work of packing commences. Half fill the box with Tea, shake it well, and place a piece of paper or a towel on the Tea, and let the manufacturer press it down with his foot. Add a little more and again press it, and let this process continue until it is filled. Place then a piece of paper on the Tea, solder the lead, paper the surface, nail down the wooden lid, stamp and number the box, viz., kind of Tea and Plantation whence prepared from, weigh the box, enter the number and date of manufacture in factory book, and send the box to the godown. As black Teas, if not well pressed down, pack very lightly, they are liable, during the rains, if carelessly kept, to mould if not perfectly dry; great care, therefore, must be taken to press the Teas well down. In packing fresh Teas not being fitted for drinking under eight or ten months, they ought not to be sold until the ensuing season, provided that they are to be disposed of on the spot. If to be forwarded to a distant market, they can be sent out at the end of the season.

On the method of manufacturing green Teas. Process followed by the Canton manufacturers.

On the young and fresh leaves being brought to the factory, they are thinly spread on large flat baskets or mats, and placed in the airing room to cool. After remaining for about two hours to cool, or, if brought during the night, until next morning, they are removed to the green Tea room. The pans being properly heated, or as hot as the hand can bear, the leaves, as in the case with the black Teas, are thrown into the pans, and kept either with the hand or two-forked sticks in constant motion for three or four minutes, and are then removed to the rolling table, and then rolled in the same manner in balls as the black Tea. They are then scattered most sparingly on large flat baskets, and exposed to the heat of the sun. If there is no sun, the baskets are arranged in frames, which are placed over the choolah heated with charcoal. During the drying, the leaves are frequently made into balls, and rolled in the flat baskets in order to extract the juice. The drying process continues for about two hours, and on the leaves becoming dry, those contained in two baskets are thrown together, and then four baskets-full into one, and so on until they are all collected together. In this state the leaves still feel soft, damp, and pliant by the hand, and are now brought back to the manufacturing room. Opposite to

each of the inclined pans, which have been properly heated, so as to feel warm to the hand by wood supplied to the ovens, (Fig. 20) underneath, one of the

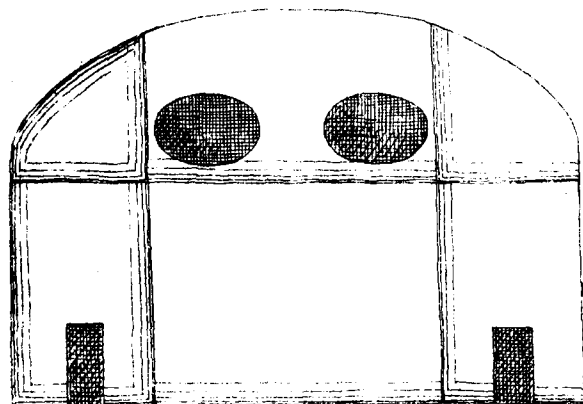


FIG. 20.

Chinese stations himself, and puts as many leaves into it as it will hold. He then moves them in a heap gently, from, before, backward, making them perform a circle, and presses them strongly to the sides of the pan. As the leaves become hot, he uses a flat piece of wood, in order that he may more effectually compress them. This process continues for about two hours, the leaves being compressed into at least half their bulk, and become so dry that when pressed against the back part of the pan in mass, they fall back in pieces. The Tea, as by this time it has assumed this appearance, is now placed in a bag made of American drill or jean (the size depending on the quantity of Tea,) which is damped, and one end is then twisted with much force over a stick, and thus it is much reduced in size. After being thus powerfully compressed and beaten, so as to reduce the mass as much as possible, the bag is exposed to the sun until it feels perfectly dry. If there is no sun, it is placed in the heated pan, and there retained until it is so. This finishes the first day's process. On the second day it is placed in small quantities in the heated inclined pans, and moved up and down against the sides and bottom with the palm of the hand, which is made to perform a semi-circle. This is continued for about six hours, and by so doing the colour and bloom of the Tea is gradually brought out. Third day, it is passed through sieve baskets of different dimensions, then exposed to the winnowing machine, which separates the different kinds of green Teas. The winnowing machine is divided into a series of divisions which receives the different kinds according to their size and weight.

Process followed by the Chinese Green Tea makers from Shanghai.

As soon as the young and fresh leaves have been gathered, they are immediately

taken to the factory and worked up, as they state that if leaves are kept for any length of time they are not fitted for green Tea of the first class, the bloom or colour being liable to be injured if the leaves are kept for any length of time. The green leaves are heated in the oven, (Fig. 21) and rolled similarly to black Teas on a mat. They are then scattered

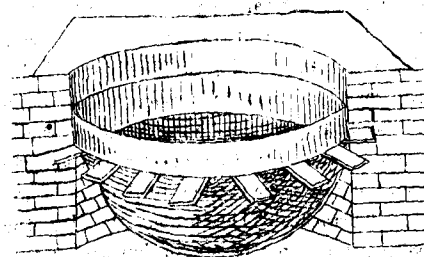


FIG. 21.

very thinly on flat askets and exposed to the sun. The pan in this oven is placed quite horizontal, the bars being used to fasten it into the masonry. During exposure to the sun the leaves are frequently made up into balls and rolled into flat baskets. If the leaves be

very wet, they, after being rolled on the mat, are dried over charcoal in the basket, (Fig. 22) and by doing so they are not therefore exposed directly to the fumes of the charcoal. On being partially dried the leaves are then transferred to the pan, which has been heated to a temperature of from 140 to 150, and moved up and down violently for about 2½ to 3 hours, or until they are quite

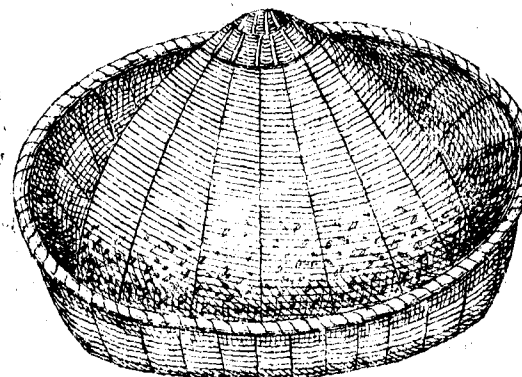


FIG. 22.

dry. By this time they present a mass of different kinds of Tea mixed together.

Sifting.

Before packing the different kinds of Teas through the sieves, they are sifted with flat baskets, to remove all the light kinds, which are very supple and bend easily under the hand, (Fig. 23) and by the winnowing machine they are then passed through the sieves, Nos. 1 to 14, by means of which the different kinds are separated from each other, the meshes of the sieves being of various fineness. They are then picked with the hand. The different kinds of Teas being now completely separated, they

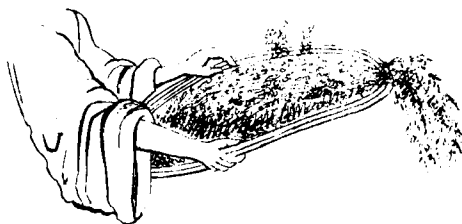


FIG. 23.

are again thrown into the deep pans, worked up and down for two or three hours, one of the Tea makers every half hour taking out a certain quantity, and places it on a flat basket, and examines it to see if the proper colour and bloom has been obtained. If the colour be not deep enough and uniform, it is retained in the pan. On being satisfied, the Teas are removed from the pan and packed hot.

Packing green Teas.

The lead and wooden boxes being prepared, as with the black Teas, the green Teas being much more brittle owing to being much more fried, are liable to be much more broken if not carefully packed; they are, therefore, not pressed down with the hand or foot; but the boxes are merely shaken, which causes the Teas to pack firmly. The Teas being warm, the box is first half filled with Tea, then shaken, and more added. This continues till the box is quite full. Paper is then put on the surface, the lead soldered, and the upper portion of the lead box papered. The wooden box is then nailed, papered, stamped, numbered, weighed, entered in the book, and then sent to the godown.

Stamping and papering boxes.

The following is the method pursued. The stamps being prepared, consisting of—1, edgings; 2, name of Plantation whence the Tea has been prepared; 3, year and number, 4; Government mark—the box is first papered, the different stamps are then appended with paste, colored with Nesso or Extract of Barberry, the boxes are then exposed to the sun to dry, and, when perfectly dry, entered in the factory book and sent to the godown. The boxes must always be entered in the factory book before they leave the factory, and the numbers compared, in order to see that those inserted in the book correspond with those on the boxes.

It is a remarkable fact that Teas, when kept in a godown for some time, acquire additional weight.

Kinds of Teas prepared.

The following are the kinds of Teas now prepared:—

1 Hyson	...	...	...	...	...	1st and 2nd Class.
2 Young Hyson	...	...	...	...	...	1st and 2nd Class.
3 Gunpowder	...	...	...	...	...	1st and 2nd Class.
4 Imperial Gunpowder	...	...	...	...	...	1st and 2nd Class.
5 Hyson Skin or Twankay.						

Colouring Teas.

No colouring matter is used in any of the factories, and as China green Teas are generally coloured by ferrocyanide of iron and Prussian blue, and gypsum, which is used to fix the colouring matter, the Indian Teas have not their fine bluish green colour, and are not by some parties so much prized. But, as well remarked by Mr. Warrington, who has devoted considerable attention to the subject, it appears from these examinations that all the green Teas that are imported into this country (Britain) are faced, or covered superficially, with a powder consisting of either Prussian blue and sulphate of lime or gypsum, with occasionally a yellow or orange-coloured vegetable substance (turmeric?) or by sulphate of lime previously stained with Prussian blue or by Prussian blue and the orange coloured vegetable substance with sulphate of lime and a material supposed to be kaoline, or of sulphate of lime alone, as in the unglazed varieties. It is a curious question what the object for the employment of this facing can be, whether as when sulphate of lime alone is used, it is simply added as an absorbent of the last portions of moisture which cannot be entirely dissipated in the process of drying, or whether it is only, as I believe, to give that peculiar bloom and colour so characteristic of the varieties of green Tea, and which is so generally looked for by the consumer, as the want of the green colour as in the unglazed variety affects the selling price. This surely can only arise from ignorance, the want of the above facts being generally known, as it would be ridiculous to imagine that a painted and adulterated article should maintain its preference over a more genuine one. In the Chinese anxious to use Government factories the Chinese were most desirous of colouring their pale yellowish Hyson skins or Twankays, remarking that unless it were done they would not fetch a fair price in the market. But on no occasion has colouring matter been allowed. During the months of May and June dust-storms prevail in the plains, and this dust is frequently carried into the interior of the Himalayas and deposited on the Tea bushes. This was particularly the case in 1854, and parties might, on examining the Teas with a microscope, imagine that this dust was added purposely in order to assist in giving a good colour to the Teas. I mention these facts, as more than one person has fallen into this error.

CHAPTER VII.

On making Tea boxes.

The boxes are made of different sizes, viz., from 5lbs to 40lbs, which is the largest, as the size is readily portable throughout the mountains. Formerly there were Chinese Tea chest makers attached to the factories; but the native carpenters are now so

expert in making Tea chests as to render it quite unnecessary to employ Chinese. A good native carpenter, with wages from 3 to 4 annas, (4d. to 6d.) will make daily boxes capable of packing from 30 to 100 lbs of Tea. Timber for making Tea boxes is everywhere available in the plains in

Kinds of timber used.
abundance, viz:—

Huldie	Nauclea Cordifolia.
Doodie	Wrightea Molissima,
Kheim	Nuclea Parvifolia,
Toon	Cedreta Toona,
Jamun	Gyzygium Jambolanum,
Senul (Cotton Wood)	Bombax Septaphyllum,
Mangoe	Mangifera Indica,
Saul, &c.,	Ghoorea Robusta,

And in the Hills.

Toon	Cedreta Toona,
Wahut	Juglaus Regia,
Cheer	Pinus Longifolia,
Rhododendron	Rhododendron Arbutum,
Huldee	Nauclea Ardifolia,
Kurruck	Celtis Tetrandra,
Oie, &c.,	Acacia Kangraensis,

Are all admirably fitted for the purpose.

The cheer has a slight smell; but it loses it when the wood is cut at the proper season and kept for some time. This is highly important, as cheer wood abounds every where, is very light and easily worked.

Planks can either be procured by contract, or sawyers may be kept attached to the establishment. I find the former plan the cheapest when I can procure them. Good sawyers can be had at Rs. 6-12-0 per man.

Sheet lead.

Sheet lead making is a much more complicated process, and therefore requires some consideration. To make sheet lead, the manufacturer mixes $1\frac{1}{2}$ to 3 seers of block tin with a pukka maund of lead, and melts them together in a cast metal pan. On being melted, the flat stone slabs under which it is his intention to run the lead are first covered with 10 or 12 sheets of smooth paper, the hill paper being well adapted to the purpose, which are pasted to the sides and chalked over. He then places the under stone in a skeleton frame of wood to keep it firm, and above it the other stone. On the upper stone the manufacturer sits and gently raises it with his left hand; assisted by throwing the weight of his body backwards with his right hand, he fills an iron ladle with the molten matter, throws it under the raised slab, which he immediately compresses and brings forward, (it having been placed back, and thus over-lapping the under-slab by about half an inch) with his own weight. On doing so the super-abundant lead issues in front and at both sides. What remains attached to the slab is removed with the ladle. The upper slab is now lifted, and the sheet of lead examined; if devoid of holes, it is retained.

If, on the other hand, there are several, which is generally the case with the first two or three sheets run, or until the slabs get warm, it is again thrown back to the melting pan. After having run off a series of sheets, the slabs are to be examined, and if the paper is in the least burned, the first sheet is to be removed, and the under one taking its place, thus securing an uniform smooth surface, is then to be chalked. According to the size of the stone slabs used, so is the size of the sheet lead. Those now in use are 16 inches square by 2 inches in thickness, and are a composition principally formed of lime. To make sheet lead boxes, a model one of wood (a little smaller than the box for which the lead is intended) is formed, which has a hole in the bottom, and a transverse bar of wood to assist in lifting it up, instead of a lid. The lead is then shaped on this model and soldered. This being done, the model is removed by the transverse bar, and by pressing, if necessary, through the hole, the lead box is then papered over in case there should be any small holes in it to prevent the action of air on the Tea, and, when dry, transferred to the wooden box for which it was intended.

The sheet lead thus made, owing to the want of sufficient pressure, is much thicker than that procured from Europe, viz., in the proportion of nine to six. In a large establishment, therefore, it would be much more economical to import sheet lead from Europe, or adopt measures to improve the method of preparation. Natives are highly expert at soldering,

Sheet lead made by Chinese heavy.

Ought to be imported from Europe.

and all therefore that is wanted is the lead. At present, all the sheet lead required for the different factories in Gurhwal, Deyrah Dhoon, and Kangra is prepared at Kaoligir, and forwarded to the different factories, and by natives the lead boxes are made up. By an expert workman, from 16lbs, 20lbs, 10lbs boxes are capable of being made per diem, or boxes capable of packing 200lbs of Tea. The wages of such a workman vary from Rupees 8 to Rupees 10 (16s. to 1£) per mensem.

Paper admirably fitted for packing boxes is prepared in the hills from different species of daphne, and is sold at a low rate, viz., from 36 to 40 double sheets for the Rupee (2s.) This paper is not liable to be attacked by the small insect generally known as the fish insect by Europeans,—species of *lapisma*.

Colouring Tea boxes.

For colouring the Tea boxes, an Extract made from different species of Barberry,

Berberis Asiatica,
Berberis Nepalensis,
Berberis Lycima,
Berberis Aristata, &c.,

which are abundant in the Himalayas at altitudes varying from 3,000 to 7,000 feet, is well adapted. One or more species are to be met with in almost every district. In the bazars an Extract of Barberry is also sold under the name of *Rusat*, which is well adapted for colouring Tea boxes.

CHAPTER VIII.

Labour.

Labour is very abundant and cheap, wages ranging from Rupees 4 to 5, or 8s. 10s. per mensem. By the late Census the population of Kumaon was* and Garhwal. Owing to the poverty of the country, thousands of the male population migrate to the plains and hill sanatoria to obtain a livelihood. The principal castes met with are the Brahmins, Rajpoots, and Domes. In the Deyrah Dhoon labourers abound, all foreigners to the District and principally residents of Lucknow. Strong and able-bodied men—

the natives of the valley—are a highly indolent and lazy class of people, and to their indolent habits, in a great measure, the wretched state of backwardness of this lonely valley. Four hours' labour per diem is by them considered a good day's work; but, as is stated, it is not necessary to employ the resident, as foreigners in any number from a hundred to several thousands can easily be obtained at Rs. 4 per mensem, and these soon become very good Tea-makers and Tea-growers. These men generally work in the Plantations for two or three years, and then ask for leave to proceed to their homes, taking with them the money that they have earned. In six months they again return to their work, having spent all their savings. A labourer in any average year can easily live on Rs 2 (4s.) per mensem, and thus in two or three years saves from Rs 60 to 70 (£6 to £7).

In the Kangra Valley labour cheap and good abounds, and any number of men from 100 to 10,000 are available at from 4 Rupees to 5 Rupees per mensem. With them employment in the Plantations is highly popular, and in muster days there are always numbers present anxiously looking for work. Prejudices against the cultivation they have none, provided they are not compelled to work with the plough. In their habits they are docile, and with care on the part of the planters will become soon good workmen. Daily the work is becoming more popular, and with European capital and energy it can easily be made general. But, like all natives in Upper India, they require proper superintendence. Treated with kindness and firmness, they are easily guided. Honest to a degree, they look to the European as belonging to a superior class, as from him they are in the habit of getting justice and redress when it is called for. To maintain this high and proud position the European planter must always act with justice and probity towards those coming under him, and though the natives generally make good workmen when well tended to and superintended, yet, in their habits being lazy and addicted to idleness, it will ever be the duty of the planter who wishes to carry out a successful speculation to treat them kindly and firmly, but at the same time, by energy and activity on his part, that his wishes are properly carried on. Tea—planters have something more than the planting of Tea to do. Their materials for working are raw and rough, and if, by industry on their part, no exertions are made to refine them, and if, after the Tea plants have been planted, the native establishments are not urged on, but allowed to remain idle until the Tea plants yield leaves, the work of such parties must end in disappointment and failure.

* See Printed Official Report.

Roads.

At present the mountainous districts of the Himalayas are, in most places, devoid of roads fitted for beasts of burden. But in all the localities where Tea factories and Plantations have been established, good roads fitted for beasts of burden are being made. A great road through the centre of the Province from North to South is now in progress, and another from East to West already exists though in bad repair. This road is, however, to receive the attention it merits, as one of the main outlets of the commerce of the Province. Leading to the plains from the richer Districts, and though best fitted for Tea cultivation, several roads are now being made to develop their resources, all of which will be useful and available to Tea-planters and fitted for beasts of burden, and render available

Roads in Kumaon.

the labourers who are now employed as carriers for the Tea Plantations. Bad means of intercommunication are, no

Good roads necessary.

doubt, the crying evils of the Provinces. But Government are fully alive to the importance of having good roads, and as Tea cultivation becomes general, and thus increases the wealth of the country, steps will, no doubt, be taken to introduce roads when the wants of the country render them imperative. Without roads no country can progress in civilization, and until they are generally introduced into the Himalayas, the wretched superstition which every where prevails, and the thralldom by which the people are held by the Brahminical portion of the community, must continue. Planters, therefore, in settling, will find these difficulties to contend with, but which they can overcome by energy and perseverance. Planters settling in Eastern or Kali Kumaon would send

Roads in Kumaon.

their surplus Teas to the plains by the Burundo Ghaut, through which there is a good road* fitted for beasts of burden. Planters settling in the centre of Kumaon should send their surplus Teas to the plains *via* Rampoor, Bheem Lal and Huldwaine, or by the Bamourie Ghaut. From Almora to the foot of the hills is about 36 miles, and the road is admirably fitted for beasts of burden. Planters again settling in the Kutywar District of Kumaon 30 to 40 miles North of Almora, would send their surplus Teas to the plain *via* the Ramgunga Valley to Ramgunga and Chilkia, to which a new road is now being made and which will be connected with the Kutywar District.

From Gurhwal planters would send their Teas to the plains by the road leading to Rugubabad, or by the pilgrim road to Juppoo Bund at the foot of the hills, where the Ganges debouches from the mountains. On this line of road there is nothing at present but primitive rope bridges. But these are about to be re-placed by substantial iron suspension bridges.

In Western Gurhwal, where land may occasionally be obtained at a low rate, roads do not exist, and in this miserably neglected country the very paths are unfitted for unladen cattle. Goats and sheep do, however, manage to travel.

In the Deyrah Dhoon roads fitted for carts are available. The great rivers, the Ganges and Jumna, forming its Eastern and Western boundary, also render water-carriage available at a short

Roads in the Deyrah Dhoon.

* See Map of the Province lately published by Government.

stance. Carts heavily laden daily traverse the Mohun Ghaut, through the Sewalik range of mountains, and from thence to Meerut it is only ten marches, and there, in a few years, the railroad will be available. The road leading through the Eastern portion of the valley and finding exit at Hurdwar is now being put into good order for wheeled carriages. Here, therefore, means are presented for forwarding any quantity of Teas, at a cheap rate, to good and distant markets, nor are the means much less favourable to Planters in Kumaon and Gurhwal. Once they have conveyed their teas to the plains as ere long rail or tramways will traverse Rohilkund, and that too before they will be required by the Tea planter. In the Kohistan of the Punjab much attention has lately been paid to roads in order to develop the resources of the

Roads in the Kohistan of the Punjab.

country. Leading from the Kangra valley there are now two magnificent roads fitted for wheeled carriage, (See Map*)

from whence Teas can be carried to Lahore or Ferozepore, and thence by water to the Port of Kurrachee. Throughout the Hill Districts of Coolpo and Mundie there are excellent roads for beasts of burden, and from Brij Nath, (See Map) camels can always be employed, thus rendering the carriage of Teas to the plains very trifling. Carriage from Kumaon, Gurhwal, Deyrah Dhoon and Kohistan of the Punjab will not average more when beasts of burden, carts, &c., are employed than 1d. per pound to convey the Teas to Sea Ports, viz., from the former to the Port of Calcutta and from the latter to Kurrachee.

Markets available in India.

All the Teas now produced by the factories find a ready sale in the country at highly remunerative prices. By natives considerable quantities of second class Teas are purchased, partly for retail and partly for their own consumption. In Kumaon the native merchants purchase the second class Teas in order to barter with the Bhotiahs of the Frontier Towns and Tibet for their produce, and by them, provided the Teas are sold at a sufficiently low rate, a considerable quantity of Tea will always be purchased. At the present moment the amount of capital invested in the Tea trade of Thibet is about £30,000, which, with judicious management, may be greatly increased. The Teas now principally used in Thibet are brick Teas, a kind of Tea of very inferior quality. To supply the wants of Cashmere, &c., 200,000lbs of inferior quality Tea are annually imported into Umritzur from Bombay. The Cashmeries, who are numbered by thousands in Umritzur, Lahore, Noorpoor and throughout the Kangra District, Jelalpoor, &c., are all Tea drinkers. The inhabitants of the North and West of the Punjab, as Afghanistan, Cashmere, &c., are all Tea consumers. Natives generally too are very fond of Tea, and are only prevented from being extensive purchasers by its being dear. The European portion of the Army consume a large quantity of Tea. In this country, therefore, there is available a considerable market without having recourse to exportation. But Teas must be extensively cultivated to enable the prices to be reduced before Natives become general consumers.

Prices realized for Teas in India.

The prices now realized are fine black Teas, second class black Teas, fine Green Teas, second class green Teas. See Table appended.

* See District Map lately published by Government.

Table showing the rates at which the Government Teas sold by public auction at Almorah and Deyrah Dhoon in 1855 and 1856.

DESCRIPTION OF TEAS SOLD.	TEAS SOLD AT ALMORAH.						TEAS SOLD AT DEYRAH DHOON.					
	In 1855.			In 1856.			In 1855.			In 1856.		
	Maximum per pound.	Minimum per pound.	Average per pound.	Maximum per pound.	Minimum per pound.	Average per pound.	Maximum per pound.	Minimum per pound.	Average per pound.	Maximum per pound.	Minimum per pound.	Average per pound.
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
GREEN TEAS.												
Gunpowder	4 12 0	4 8 0	4 8 2	4 14 0	3 0 0	3 12 8	0 0 0	0 0 0	0 0 0	4 0 0	2 8 0	3 4 9
Young Hyson	4 8 0	1 8 0	2 14 5	0 8 0	0 5 0	0 6 6	0 0 0	0 0 0	0 0 0	2 9 0	1 7 0	1 9 4
Hyson Skin	0 7 0	0 5 0	0 5 10	0 8 0	0 5 0	0 6 6	0 0 0	0 0 0	0 0 0	2 9 0	1 7 0	1 9 4
BLACK TEAS.												
Souchong	2 15 0	1 1 0	2 9 11	4 0 0	3 0 0	3 10 4	5 4 0	2 4 0	2 8 11	2 2 0	1 1 0	1 15 8
Pouchong	1 11 0	0 14 0	1 2 10	2 10 0	1 9 0	2 3 8	2 12 0	1 5 0	1 10 2	1 8 0	0 13 0	0 15 6
Bohea	0 9 0	0 7 0	0 7 10	0 11 6	0 5 0	0 6 3	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0

But these are merely fancy prices, and as soon as Teas are thrown extensively into the market, they will be greatly reduced. The high prices that now prevail are satisfactory, as they show how highly the Teas are approved of by the public.

CHAPTER IX.

Building materials.

Building materials every where abound, and can be had in any quantity. Every where throughout the Hill Provinces, building materials in the form of the finest sand stone or free stone—granite—gneiss and mica slate abound. For roofing purposes clay slate is common, affording, in many places, slates equal to the finest in the world. Limestone, either in the form of compact lime-stone, or calcareous sinter and tuffa abound fitted for making lime of the finest quality. Timber of the finest description abounds, such as cedar, pine, cypress, oak, sissoo, syn, saul, &c.; iron too abounds throughout the Provinces, and it only requires European capital and energy to develop it, to render its price a minimum in the market. Even now it is produced from the mines by natives by their rude processes and manufacture; it is cheap, though dearer than English iron £15 to £16 10s. per ton, and admirably fitted for all the purposes of a Tea Plantation and factory,—such as making tools, nails for boxes, &c., &c. A small house fitted for the planter will cost about £200.

Supplies.

Grain, such as wheat, rice, &c., is every where to be met with unless in some of the poorer Districts of Kumaon and Gurhwal, and sold at very low rates, viz., 80 to 160 lbs. per Rupee, or 2s. Sheep and goats too are plentiful, and can be purchased at from Rupee 1 to Rupees 3 each (2s. to 6s.) Fowls can be procured easily in many Districts. But all other kinds of poultry must be procured from the plains. Clothing, wearing apparel of every description, must be imported from the plains, or obtained from the chief stations in the Hills, at Missourie, Simlah, &c. Throughout the length and breadth of the Hills, manufacturers of any kind are unknown, barring at Noorpoor, in the Kohistan of the Punjab, where shawls, &c., are made. Nothing, therefore, can be obtained by our planters on the spot.

Terms on which grants are given by the Government, and rates at which small farms may be procured in Kumaon and Gurhwal from the Zemindars.

The following are the terms offered by the Government in their Notification published on the 26th of September 1855:—

Revenue Department.

No. 2109 A. "Grants of land for Tea cultivation in the Kumaon and Gurhwal Districts of the Kumaon Province will be made on the following conditions on application to the Senior Assistant Commissioner of the District.

2. "Each grant will be of not less than 200 or more than 2000 acres. More than one grant may be taken by one person or Company on the applicants satisfying the Local Authorities acting under the usual control in the Revenue Department, of their possessing sufficient means and capital to undertake an extended cultivation and manufacture of Tea.

3. "One-fourth of the land in the grant will be given free from assessment in perpetuity, on fulfilment of the conditions below stated.

4. "The term of the first lease will be for four and twenty years, the grant will be rent free; in the fifth year one anna per acre will be charged on three-fourths, or the assessable portion of the grant; two annas per acre in the sixth year; three annas in the seventh year, and so on, one more anna being added in each year, till in the last the maximum rate is reached of one Rupee per acre. The full assessment on a grant of 2000 acres will thus not exceed 1500 Rs. per annum.

5. "The following are the prescribed conditions of clearance:—

"At the close of the fifth year from the date of grant, a twentieth part of the assessable area; at the close of the tenth year, one-fifth of the assessable area; at the close of the fifteenth year, half of the assessable area; and at the last year, three-quarters of the assessable area is to be cleared and well stocked with Tea plants.

6. "In the twenty-first year, on the fulfilment of the above conditions, the proprietary right in the grant, and the right of engagement with Government, shall vest in the grantee, his heirs, executors or assigns, under the conditions generally applicable to the owners of estates in Kumaon, and the rate of assessment on the lands in the grant, in whatever manner cultivated, shall never exceed the average rate on grain crop lands in the same locality.

7. "On failure of payment of the prescribed assessment in any year, or of any of the above conditions (the fact of which failure shall, after local enquiry, conducted by the Senior Assistant Commissioner, be finally determined by the Sudder Board of Revenue) the entire grant shall be liable to resumption, at the discretion of Government, with exception of the assessable area which may be *bond fide* under cultivation with Tea, and to a further portion of land which shall be allowed in perpetuity, free of assessment to the extent of one-fourth of such cultivated area. The portions so exempted will remain in the possession of the grantee subject to the usual rates and rules of assessment in the District.

8. "Grantees shall be bound to erect boundary pillars at convenient points round the circuit of a grant, within six months from its date, failing which such pillars will be put up by the Government Officers, and the cost thereof shall be recoverable from the grantee in the same manner as the regulated rate of assessment.

9. "No claim to the right and interest in a grant on any transfer by the original grantee will be recognized as valid, unless on registry of the name of the transferee in the office of the Senior Assistant Commissioner.

10. "So long as Government establishments for the experimental growth and manufacture of Tea shall be maintained in the Province, supplies of seeds and plants will be given gratis to grantees, on application to the Superintendent Botanical Gardens, North Western Provinces, as far as may be in his power."

The land available for grants is generally covered with timber trees, consisting of oak, rhododendrons, chear, ayar, (audromeda) &c., which it will be necessary for the grantee to clear. These timber trees, when felled, are admirably fitted for building purposes,

making Tea boxes, and all the different kinds of furniture required in Tea factories—

Lands available for grants covered with timber.

charcoal, firewood for the use of the factory,—so that though the expense of clearing the jungle be great, yet all the timber can be usefully employed. A planter must always have a certain quantity of timber available for working purposes. In addition to land covered with timber, in almost every direction small farms are available by purchase.

These terms are highly liberal, and no planter ought to take and bring under cultivation a tract of less than 400 acres. Small tracts met with and available near the capital of Kumaon will not pay the expense of cultivation. At present, owing to the high rates realized by Teas, they will do so. But planters must be prepared to sell their Teas at 8 annas per pound, and they cannot do so unless they cultivate a large tract. We say 8 annas, as when Tea cultivation becomes extensive, the Teas must be sent into the markets at rates capable of competing with China Teas. No doubt, no good China Teas are procurable in this country at 1 Rupee per pound. But let Himalayan Teas be largely cultivated and sent into the market, and it will be found necessary and possible to sell China Teas at a lower rate than at present; and if it cannot be done with profit, Indian Teas will monopolize the market. With good management, owing to the low rent of lands and cheap labour, this country will always be able not only to compete but undersell China Teas, once that a proper amount of capital is invested in the cultivation.

In addition to the liberal grants of land, Government allow, as mentioned in the Notification, Tea plants and seeds to be given gratis from their Plantations to parties indenting for them and entering on the cultivation of Teas, and the quantity of Tea seeds distributed to the public this year exceeds 20,000lbs, and of Tea plants nearly five hundred thousand have also been given to different private parties. In the coming season there will be upwards of two millions of seedling plants and 30,000lbs of Tea seeds available for distribution throughout the Plantations. Planters must provide carriage, &c.

No. 3.

Table showing the maximum, minimum and average temperature at Hawulbaugh, &c., &c., during the years 1853, 1854 and 1855, and the fall of rain during the same periods.

NAME OF PLANTATION.	Month.	Year.	MORNING 6 A. M.			NOON 12.			EVENING 6 P. M.			RAIN DAY.		RAIN NIGHT.		TOTAL.	
			Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	I.	C.	I.	C.	I.	C.
Hawulbaugh	January	1853	50	43	45	53	52	54	59	50	55	4	95	0	0	4	95
"	February	"	50	40	44	56	47	52	61	45	52	0	30	1	59	1	89
"	March	"	57	44	51	68	50	65	73	55	64	0	60	0	38	0	98
"	April	"	65	51	59	78	66	71	78	62	71	1	59	0	40	1	99
"	May	"	76	60	68	88	70	79	86	66	77	0	0	2	94	2	94
"	June	"	84	71	76	88	73	81	87	74	80	0	0	5	78	5	78
"	July	"	84	74	75	83	73	78	82	70	78	7	42	9	69	17	11
"	August	"	76	72	74	81	76	78	79	70	74	5	82	6	39	12	21
"	September	"	76	63	71	80	73	77	79	70	74	0	15	2	63	2	78
"	October	"	75	76	75	76	64	68	76	60	69	2	88	2	1	4	89
"	November	"	59	43	51	61	54	64	69	57	63	0	0	0	42	0	42
"	December	"	48	39	43	53	52	54	61	54	63	0	0	0	0	0	0
Total.....												23	71	32	23		
Rain during the year, Grand Total....												55		94			
Hawulbaugh	January	1854	46	33	41	56	46	50	60	46	54	0	0	0	0	0	0
"	February	"	47	41	44	64	54	60	60	51	57	1	41	2	59	4	0
"	March	"	56	46	50	66	50	62	65	50	57	0	4	0	2	0	6
"	April	"	68	52	59	78	63	70	76	60	66	5	8	0	0	5	8
"	May	"	70	60	65	82	69	76	82	70	76	10	5	13	3	23	8
"	June	"	78	61	73	86	78	81	89	80	83	4	52	6	87	11	39
"	July	"	77	73	74	83	77	79	80	75	74	0	0	0	0	0	0
"	August	"	72	76	71	83	76	80	82	74	79	8	65	6	15	14	80
"	September	"	76	71	70	81	72	77	82	71	75	6	17	4	82	10	99
"	October	"	77	68	60	75	65	69	76	61	69	0	7	0	0	0	7
"	November	"	58	45	51	65	54	63	68	58	62	0	10	0	0	0	10
"	December	"	47	41	44	59	53	55	62	55	58	0	0	0	0	0	0
Total.....												36	9	33	48		
Rain during the year, Grand Total....												69		57			
Hawulbaugh	January	1855	46	33	41	56	42	50	56	45	48	1	7	7	6	8	13
"	February	"	48	41	44	61	51	56	60	51	57	1	6	1	2	2	8
"	March	"	56	46	50	66	50	62	66	50	57	12	9	3	43	15	52
"	April	"	64	52	55	77	60	68	78	60	67	1	64	1	73	3	37
"	May	"	72	61	66	86	76	81	84	76	80	0	23	0	38	0	61
"	June	"	80	72	76	89	73	81	88	72	80	5	95	5	90	8	85
"	July	"	76	70	78	86	73	77	82	72	78	7	75	7	41	13	16
"	August	"	78	74	76	82	76	80	81	76	79	6	73	6	6	7	79
"	September	"	77	76	77	82	70	76	81	69	76	4	42	4	1	6	43
"	October	"	68	58	58	73	56	66	74	76	73	0	6	0	3	0	9
"	November	"	56	44	51	66	47	56	68	60	65	0	0	0	0	0	0
"	December	"	46	39	43	57	41	50	61	56	60	0	0	0	0	0	0
Total.....												41	0	25	3		
Rain during the year, Grand Total....												66		3			

[illegible][illegible][illegible]

NAME OF PLANTATION.	Month.	Year.	MORNING 6 A. M.			NOON 12			EVENING 6 P. M.			RAIN DAY.		RAIN NIGHT.		TOTAL.	
			Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	I.	C.	I.	C.	I.	C.
Holta Kangra	January	1853	54	43	48	62	48	56	66	49	57	0	0	0	0	0	0
"	February	"	54	43	48	64	50	57	58	46	52	0	0	0	0	0	0
"	March	"	66	40	53	75	52	64	72	50	61	0	0	0	0	0	0
"	April	"	71	52	61	78	61	69	76	60	68	0	0	0	0	0	0
"	May	"	76	55	66	82	65	73	80	57	69	0	0	0	0	0	0
"	June	"	82	70	76	88	70	79	88	72	80	0	0	0	0	0	0
"	July	"	75	68	72	77	76	74	76	70	73	0	0	0	0	0	0
"	August	"	72	76	71	76	69	73	75	69	72	0	0	0	0	0	0
"	September	"	72	66	69	80	70	75	74	70	72	0	0	0	0	0	0
"	October	"	64	60	62	73	62	68	74	66	66	0	0	0	0	0	0
"	November	"	63	60	61	73	61	67	73	51	66	0	0	0	0	0	0
"	December	"	56	45	51	68	55	61	65	51	58	0	0	0	0	0	0
Holta Kangra	January	1854	54	48	51	63	40	58	58	42	55	0	0	0	0	0	0
"	February	"	47	39	40	58	42	45	51	40	44	0	0	0	0	0	0
"	March	"	66	50	55	76	50	62	72	44	59	0	0	0	0	0	0
"	April	"	74	58	65	82	66	72	85	60	69	0	0	0	0	0	0
"	May	"	81	61	70	91	60	78	88	60	75	0	0	0	0	0	0
"	June	"	88	60	76	90	67	81	86	71	79	0	0	0	0	0	0
"	July	"	75	69	72	80	79	76	78	69	73	0	0	0	0	0	0
"	August	"	72	68	70	78	69	74	78	69	74	0	0	0	0	0	0
"	September	"	72	66	69	76	68	74	76	67	71	0	0	0	0	0	0
"	October	"	64	58	63	74	66	72	72	65	70	0	0	0	0	0	0
"	November	"	62	53	57	69	56	64	64	54	60	0	0	0	0	0	0
"	December	"	52	48	49	60	52	56	58	56	54	0	0	0	0	0	0
Holta Kangra	January	1855	50	36	48	57	42	49	55	38	50	0	0	0	0	0	0
"	February	"	54	46	50	64	56	60	62	50	56	0	0	0	0	0	0
"	March	"	53	47	51	62	58	61	64	50	68	0	0	0	0	0	0
"	April	"	70	52	56	77	56	66	71	52	61	0	0	0	0	0	0
"	May	"	72	54	58	70	54	59	73	50	61	0	0	0	0	0	0
"	June	"	81	74	77	87	76	80	84	74	80	0	0	0	0	0	0
"	July	"	73	69	70	77	69	75	75	70	71	0	0	0	0	0	0
"	August	"	74	68	71	78	69	75	76	71	72	0	0	0	0	0	0
"	September	"	70	64	67	76	66	72	79	68	70	0	0	0	0	0	0
"	October	"	66	52	60	76	58	71	72	60	66	0	0	0	0	0	0
"	November	"	61	52	56	70	60	65	74	60	68	0	0	0	0	0	0
"	December	"	54	48	57	66	53	62	59	48	54	0	0	0	0	0	0
Kaoligir	January	1853	48	40	44	66	46	52	70	47	54	1	78	0	0	1	78
"	February	"	57	49	52	67	55	61	61	49	55	2	20	0	0	2	20
"	March	"	77	55	62	77	63	70	77	59	68	0	72	0	0	0	72
"	April	"	73	59	68	81	65	70	79	63	71	1	15	0	0	1	15
"	May	"	77	63	73	85	70	77	85	56	65	0	93	0	0	0	93
"	June	"	81	71	76	87	73	81	89	73	81	11	55	0	0	11	55
"	July	"	75	71	72	79	71	74	77	71	74	6	10	0	0	6	10
"	August	"	73	69	71	75	73	74	75	71	73	20	26	0	0	20	26
"	September	"	71	67	69	75	71	72	73	69	72	8	90	0	0	8	90
"	October	"	70	50	55	84	70	75	86	84	85	7	65	0	0	7	65
"	November	"	61	46	52	80	70	75	86	70	77	0	13	0	0	0	13
"	December	"	57	40	55	78	64	68	79	62	67	0	0	0	0	0	0
Total.....																	61 37
Rain during the year, Grand Total....																	61 37

NAME OF PLANTATION.	Month.	Year.	MORNING 6 A. M.			NOON 12.			EVENING 6 P. M.			RAIN DAY.		RAIN NIGHT.		TOTAL.	
			Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	Maximum.	Minimum.	Average.	I.	C.	I.	C.	I.	C.
Kaoligir	January	1854	53	45	48	60	51	54	57	49	51	7	0	1	6	8	6
"	February	"	51	40	45	70	60	65	70	64	69	5	41	0	0	5	41
"	March	"	64	42	53	84	66	76	90	78	70	1	10	0	0	1	10
"	April	"	70	50	64	92	86	86	92	86	89	0	0	0	0	0	0
"	May	"	79	60	68	100	70	89	105	89	94	0	0	0	57	0	57
"	June	"	84	70	76	100	79	91	101	84	95	14	80	0	0	14	80
"	July	"	78	70	75	98	76	84	94	86	90	5	0	5	95	10	95
"	August	"	76	70	73	89	74	84	94	76	89	5	59	0	0	5	59
"	September	"	77	60	68	84	70	77	96	79	80	12	5	0	0	12	5
"	October	"	76	60	64	86	70	76	90	70	80	0	65	0	0	0	65
"	November	"	62	49	54	82	70	76	83	74	79	0	0	0	0	0	0
"	December	"	55	44	48	75	54	67	74	58	70	1	85	0	0	1	85
Total.....																	53 45 7 58
Rain during the year, Grand Total....																	61 3
Kaoligir	January	1855	51	29	41	74	56	65	78	51	66	1	25	0	0	1	25
"	February	"	52	46	50	77	60	68	82	67	75	0	0	0	0	0	0
"	March	"	57	47	53	80	64	70	85	60	76	5	84	0	0	5	84
"	April	"	70	58	64	88	63	79	92	70	81	2	73	0	0	2	73
"	May	"	80	70	74	98	90	94	100	89	96	0	18	0	0	0	18
"	June	"	87	68	75	99	78	92	105	80	95	7	47	0	0	7	47
"	July	"	78	70	74	86	73	79	90	70	81	47	59	0	0	47	59
"	August	"	82	71	76	91	78	84	91	76	85	5	68	0	0	5	68
"	September	"	88	64	71	88	69	86	91	74	83	11	53	0	0	11	53
"	October	"	66	54	59	89	78	86	92	81	87	0	0	0	0	0	0
"	November	"	54	50	52	85	73	73	88	70	78	0	61	0	0	0	61
"	December	"	55	40	44	79	46	61	80	50	64	0	20	0	0	0	20
Total.....																	83 8 0 0
Rain during the year, Grand Total....																	83 8

NOTE.—The Thermometers are kept in the Verandahs of the Factories which are covered in.

CHAPTER X.

On the climate of the Kohistan of the North West Provinces and the Punjab.

All kinds of climate are available in the Himalayas and Kohistan of Punjab and valleys at the base of the mountains, from tropical to temperate and arctic. Generally the climate is well-fitted for the European constitution. From the great altitude of the mountains in all directions, a temperate climate, where the European settler can select a locality to build his house and factory, can always be obtained. By the Appended Table No. 3, the temperature at the different localities where the Government Factories and Plantations are established, is exhibited, and by it it will be seen how admirably the climate is fitted for the European constitution. The Table also shows the quantity of rain that has fallen during the last three years, or from 1853 to 1855. In the higher Plantations, as at Pooree, Almorah, Holta Kangra, &c., snow occasion-

Snow-storms not injurious to Tea plants.

ally falls in the cold weather, but does not remain for any length of time. Hail-storms also occasionally take place in the spring from March to May, and often commit great havoc by cutting and

Hail storms, and injury done by them to Tea farms.

destroying the bushes. By them the first crop of Tea leaves have, on several occasions, been entirely destroyed, causing much loss. The planter, therefore, must always be prepared to expect such storms in March, April and May. On the 11th May 1855 a tremendous hail-storm occurred at Nynce Tal in Kumaon. Some of the stones measured upwards of twelve inches in circumference. In numbers of houses a vast number of panes of glass were broken. On the mountains, several lungoors, the great black-faced monkey, were found dead with their skulls fractured. An iron boat lying on the Lake was pierced by several of the hail-stones, as if they had been round shot. The tail of this storm extended to Bheemtal, and did much damage to the Tea Plantation. In the Deyrah Dhoon and Kangra Valley these storms also occasionally occur. By the appended Table it will be seen that rain generally falls in the cold weather. This is particularly the case in the Kangra Valley, and the rains there at this season of the year are sometimes so constant as

Planter's life not fitted for an invalid officer or worn-out civilian.

to resemble the regular rains. Though the planter can always select a temperate locality for the site of his house and factory, the life that he requires to lead is not fitted for an invalid officer or worn-out civilian. At all times the direct rays of the sun are powerful in the hills, and a person who cannot stand the heat of the plains is ill-fitted to conduct the operations of a Tea Plantation. As for a planter to succeed, it will be the duty of the planter to superintend its operations at all hours of the day and at all seasons of the year, as the natives will not work as they ought to do, and a badly-worked Plantation will not pay. Several officers who have been obliged to retire from the service owing to not being able to stand the noon-day sun, have applied for appointments in the Tea Plantations. But to all such parties Tea cultivation is unfitted. Such employment, though exceedingly healthy, as the planter must be constantly in the open air, is no refuge for the worn-out and disabled soldier, or used-up civilian, as the work must be carried on with vigour and energy. The Tea-planter must be constantly amongst his men. He must not delegate to his native assistant his own duties,

and then go and amuse himself, or sit idle in his house. To all such parties we would recommend to let the work alone, as it is unsuited to their habits. Several parties have written to us from Europe, requesting information regarding Tea cultivation, and have asked how much of their time can be annually spent at the chief and fashionable Sanatoria of Simla, Mussoorie, Nynce Tal, &c. To one and all such applications we would state here, in reply, generally, that no party will succeed in Tea-planting unless he gives it his undivided attention, or unless, in his absence, he has a trustworthy European to whom he can delegate his duties. Native superintendents we have tried, and found wanting. Endless and harassing disputes with their subordinates, interference with native cultivators, evasion of orders, orders carried out indirectly, have always with them proved subjects of endless references, which can always be avoided by the Tea-planter being present. Moreover, native superintendents will not attend, when Tea-making is being carried on in the factory, to those minute and delicate processes required in firing Teas, as to him it matters not if the Tea be a little too much fired, or the contrary. They cannot see the necessity of doing the work to a nicety, as the Chinese do. For a time, therefore, planters, if they wish to keep up the reputation of their Teas, will always find it necessary to be present when their factories are being worked, and the more so if the work be entirely performed by natives. On the other hand, if he has three or four Chinese, it will equally be necessary for him to be present, in order to keep the latter in order, as more troublesome and quarrelsome people are not to be found. In the course of years, natives will, no doubt, learn the importance of accurate manipulation. Nor is the presence of planters in their Plantations less necessary, as without them their workmen will not carry on operations with that energy and activity which a good paying Plantation requires. We make these remarks, as many parties from ill-health, bad constitutions and other causes, have asked for information, in order that they might take up the cultivation as a profession, when they are both physically and mentally unfitted for it.

Diseases peculiar to the Tea Districts.

The most important diseases peculiar to Districts in the Himalayas, &c., capable of cultivating Teas, are few.

Small Pox.—This disease sometimes rages; but by the active and energetic measures now adopted by Government through their Medical Officer, Dr. Pearson, it has become much modified in its action. In one of the Tea Districts, Kutywar, it raged last year, and carried off several hundreds of the inhabitants.

Cholera.—Occasionally shows itself; but its visits are limited, and seldom commits ravages at altitudes above 6000 feet, though a few cases do usually occur.

Fevers.—Are frequent, particularly during the rains; but easily subdued in natives by purgatives and anti-periodics; and in the European, removal from a lower to a higher altitude, with anti-periodics, instantly checks the disease.

In the cold weather *Dysentery* and *Diarrhœa* prevail, and parties who have been labouring during the rainy season under fever are liable to be attacked. Moreover, in certain localities, *Diarrhœa* is liable to occur on the first visit of parties, such as at

Almorah; but the disease is easily subdued, and it is generally found to originate in the bad water of the locality.

Muka Murree or Plague.—This vile disease exists more or less annually throughout the Provinces of Kumaon and Gurhwal, and commits great ravages; but confines its attacks principally to the lower and badly fed classes. In its nature it is highly contagious. The sanatory measures adopted by Messrs. Ramsay and Colvin, the District Civil Officers, aided by the sound practical advice of Dr. Pearson, in ventilating and white-washing the houses, the removal of cattle and all filth to a distance from their villages, have caused the disease in a measure to subside. But it requires to be carefully watched, particularly as it is little influenced by any of the numerous remedial measures proposed by different Medical Officers.

Goitre.—This disease is general throughout the hills. It yields readily to the preparations of Iodine. By Captain Ramsay, who has imported Iodine largely from England, a vast number of poor individuals have been cured.

Ophthalmia.—In some Districts this disease, in its various forms, is common.

Such is a rapid account of the most common diseases met with in the Tea Districts of the Kohistan of the North West Provinces and Punjab, and as Medical men are scarce, and are nowhere procurable, unless at the principal stations, every Tea planter ought to be supplied with a medicine chest, and know a little regarding the treatment of diseases. If he does not, he will frequently be thrown on his resources and find his establishment greatly reduced, at the very time he wants hands, by numbers of his workmen shamming sickness, or by real sickness, which, when at once taken in hand, can easily be subdued by a purgative, followed up by an anti-periodic dose, and the workmen again fit for their work in the ensuing day. In the hills the general rule with a native is to go to his home the moment he feels sick, provided that he does not receive any aid from his employer in the form of medicine, and on doing so, he will give in exchange one of his fellow-villagers, an able-bodied man, no doubt; but in a manner useless in the Factory or Plantation, until he has learnt his work. This, however, as stated, can be avoided by following the course recommended. When the season for gathering the crops occur, shamming sickness is common. Let all parties who are about to settle as Tea-

The planters ought to be able to be their own physicians.

planters in the Kohistan of the North West Provinces or Punjab, make it a point, therefore, to study the treatment of diseases, as by so doing they will save much suffering to many deserving men, and themselves much trouble and annoyance. Throughout the Provinces dispensaries have lately been established by Government for the benefit of the poor classes with much advantage; but, of course, those are in their operations confined to those who cannot pay for medicines. Planters, therefore, must be their own physicians, as well as that of their establishment, and not look to foreign aid. Of course, to a large establishment a native doctor would be attached. But individual planters will not be able to afford such an expense. Individuals, therefore, with families, are not fitted for planters for the reasons here assigned, unless they can procure farms near the capital or chief stations where physicians are procurable.

CHAPTER XI.

Amount of land fitted and partly available throughout the Kohistan of North West Provinces and Punjab, for Tea cultivation.

By some parties it has been stated that were the natives of India to become Tea-drinkers, the Tea raised on lands available fitted for the cultivation would afford but an infinitesimal supply to meet the demand. This, however, is a vast mistake. By a rough calculation that we have made there appears to be fitted and available for Tea cultivation, in

Kumaon,	3,50,000 acres.
Gurhwal, East,	1,80,000 „
Ditto, West,	1,80,000 „
Deyrah Dhoon,	1,00,000 „
Jousar Bawar,	10,000 „
Kooloo,	35,000 „
Kangra,	35,000 „
Total, ...	8,90,000 „

This enormous quantity of land here given is, I am convinced, far under the mark, as it does not include large tracts admirably fitted for Tea cultivation in Hazara, Cashmere, Jummoo, protected Hill States, &c., which might afford an additional 2,00,000 acres; and, supposing that the yield per acre is 100lbs. of Tea, we should have $10,90,000 \times 100 = 109,000,000$, or one hundred and nine millions of lbs. of Tea—a quantity exceeding the whole exportation of China; and were high cultivation resorted to, the produce might be doubled, and thus not only afford a large quantity for home consumption, but also an immense supply for a great export trade, nor would it be necessary, in bringing such results about, to interfere greatly with the lands now under cultivation with cereals and other poor crops. Let each village, as in China, cultivate a certain number of acres. Let the waste lands and lands covered with virgin and useless forests, there being no markets available for the timber, be brought under cultivation with Tea, by means of British capital and enterprise, and the Hill Provinces, now considered so poor and wretched, would become as important to the State as any others of the empire. Throughout the country, too, a wholesome and refreshing beverage would be spread, and a great boon conferred on the people. Nowhere does a safer investment of capital present itself, provided the undertaking be carried on with prudence and judgment, than in Tea cultivation. But parties must not be led away by the small results now obtained by the Government Plantations, and suppose that all they have to do, to make fortunes, is to become “Tea-planters,” whether they be backed by capital or not, as without capital the undertaking must prove a failure. For British capital there is a vast and boundless field presented, and we think within bounds when we assert that a million sterling or more would readily find profit with employment if invested in the cultivation. We have appended a Table to show how a small sum of from £5,000 to £10,000 might be profitably worked by a planter.

In this estimate we have supposed that the factories are entirely worked by natives, under the personal superintendence of the planter. It would be desirable to have a few Chinese attached to the factories. To a factory supplied with Tea leaves from 2000 to 4000 acres, four Chinese would be ample, and if imported direct from China it would be necessary to attend to the following,—their ages to be from 25 or 35 years; their constitution healthy and sound; their rate of wages fixed. The men at present attached to the factories receive Rupees 33-2 per mensem.

It would also be necessary to bind them for five or more years, and in doing so, a free passage and diet money to and from China would also be required to be guaranteed. The Government rate of diet money is Rupees 6 per mensem when not dieted on ship-board. The Chinese, too, have been bound to work diligently in their agreement, and obey all lawful orders, and any of them discharged for misconduct are punished by being deprived of diet money and obliged to find their own passage to China.

In the following Districts of Kumaon and Gurhwal lands are available as grants, or can be obtained by purchase or on lease from Zemindars at low rates.

CHAPTER XII.

Tea manufactory.

The rooms of the Tea factory ought to be large and airy, and to consist of—1st, black Tea room; 2nd, green Tea room; 3rd, winnowing room; and 4th, curing room; and thus prevent the different works going on in the factory from interfering with each other.

At Almora the black manufacturing room is 53 feet long by 20 feet broad, and the other three rooms are 24 feet by 20 feet. The walls are 18 feet high. The ground plan figure shows how the ovens and choolahs are arranged. A. A. Ovens for making black Teas. B. B. for green Teas. C. C. C. Ditto green Teas. D. choolahs. See Figure No. 24.

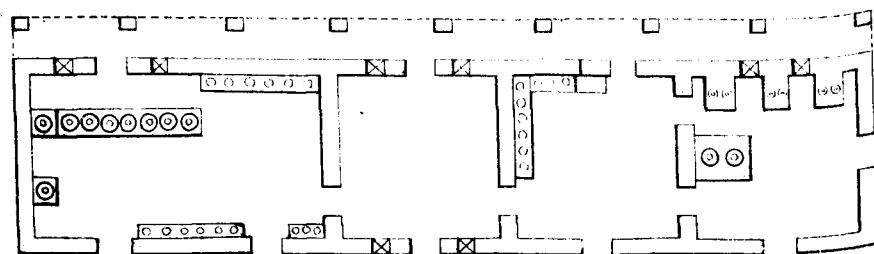


FIG. 24.

As during rainy weather much space is required in order to spread out the green leaves, verandahs 10 feet in breadth ought to be attached to the factory, particularly on the East and West sides, so that the morning and afternoon sun may be available in drying the Teas.

The size of the factory will depend on the quantity of land under cultivation, and at a rough average each acre of land may be estimated as yielding when in full bearing 800lbs of raw leaves during the season, and space ought accordingly to be afforded for working up the leaves.

The cost of building a factory will depend on its size; but one to work a Plantation of 1500 acres, can be erected at from Co.'s Rs. 2000 to 2500 in the hills. In the Deyrah Dhoon no stones being available, it will cost from Co.'s Rs. 3000 to 4000 in order to build it of good brick and mortar, and with a flat roof. The roof, owing to the risk of fire, must be *pukka*.

Cr. Table showing the Expenditure incurred in Planting and Cultivating 1,000 Acres of Land, extending over 8 years, and Return.

INCOME.		
<i>3rd Year.</i>		
By Tea prepared in 3rd year, from 400 acres, at lbs. 20 per acre. $400 \times 20 =$ lbs. 8,000, at 1 Rupee per pound	8000	0 0
<i>4th Year.</i>		
By ditto ditto in 4th year, from 400 acres, at lbs. 40 per acre. $400 \times 40 =$ lbs. 16,000; and from 400 acres, at lbs. 20 per acre. $400 \times 20 =$ lbs. 8,000. In all lbs. 24,000, at 12 annas per pound	18000	0 0
<i>5th Year.</i>		
By ditto ditto in 5th year, from 400 acres, at lbs. 80 per acre. $400 \times 80 =$ lbs. 32,000; from 400 acres, at 40 lbs. per acre. $400 \times 40 =$ lbs. 16,000; and from 200 acres, at lbs. 20 per acre. $200 \times 20 =$ lbs. 4,000. In all lbs. 52,000, at 8 annas per pound	26000	0 0
<i>6th Year.</i>		
By ditto ditto in 6th year, from 400 acres, at lbs. 150 per acre. $400 \times 150 =$ lbs. 60,000; from 400 acres, at lbs. 80 per acre. $400 \times 80 =$ lbs. 32,000; and from 200 acres, at lbs. 40 per acre. $200 \times 40 =$ lbs. 8,000. In all lbs. 1,00,000, at 8 annas per pound	50000	0 0
<i>7th Year.</i>		
By ditto ditto in 7th year, from 400 acres, at lbs. 200 per acre. $400 \times 200 =$ lbs. 80,000; from 400 acres, at lbs. 150 per acre. $400 \times 150 =$ lbs. 60,000; and from 200 acres, at lbs. 80 per acre. $200 \times 80 =$ lbs. 1,600. In all lbs. 1,56,000, at 8 annas per pound	78000	0 0
<i>8th Year.</i>		
By ditto ditto in 8th year, from 800 acres, at lbs. 200 per acre. $800 \times 200 =$ lbs. 1,60,000; and from 200 acres, at lbs. 150 per acre. $200 \times 150 =$ lbs. 30,000. In all lbs. 1,90,000, at 8 annas per pound	95000	0 0
Carried over, Company's Rupees	275000	0 0

Dr.

EXPENDITURE.		
<i>1st Year.</i>		
To Plantation Establishment, viz.		
1 Moonshie, at 10 Rupees per month, 10×12	120	0 0
2 Chuprassies, at 5 Rupees each per month, 10×12	120	0 0
2 Chowdries, at 8 Rupees each per month, 16×12	192	0 0
2 Assistants to ditto, at 7 Rupees each per month, 14×12	168	0 0
120 Mallies, at 4 Rupees each per month, 480×12	5760	0 0
	6360	0 0
To Extra Establishment, viz.		
1 Carpenter, at 8 Rupees per month, 8×12	96	0 0
1 Smith, at 8 Rupees per month, 8×12	96	0 0
	192	0 0
To Extraordinary Expenses, viz.		
Building a House for Planter	1600	0 0
Implements, Bullocks, &c.	700	0 0
	2300	0 0
	8852	0 0
<i>2nd Year.</i>		
To Plantation Establishment	6360	0 0
„ Extra Establishment	192	0 0
„ Extraordinary Expenses, Implements, &c.	800	0 0
	7352	0 0
<i>3rd Year.</i>		
To Plantation Establishment	6360	0 0
„ Extra Establishment Carpenters making boxes, &c.	384	0 0
„ Tea-maker's Establishment, viz.		
1 Jemadar, at 10 Rupees per month, 10×12	120	0 0
12 Native Tea-planters, at 5 Rupees each 60×12	720	0 0
	840	0 0
„ Extraordinary Expenses, wood for boxes, &c.	800	0 0
„ Building a Factory	2000	0 0
	10384	0 0
<i>4th Year.</i>		
To Plantation Establishment	6360	0 0
„ 30 Extra Mallies, at 4 Rupees each per month, for 5 months, 120×5	600	0 0
„ Native Tea-maker's Establishment	840	0 0
„ Tea-packing Establishment, Carpenters, &c.	800	0 0
„ Extraordinary expenses, land rent, wood for boxes, &c.	1800	0 0
	10400	0 0
Carried over, Company's Rupees	36988	0 0

Cr. *Table showing the Expenditure incurred in Planting and Culti-*

Brought forward, Company's Rupees		275000 0 0
Total, Company's Rupees		275000 0 0

vating 1,000 Acres of Land, extending over 8 years, and the Return.

Dr.

Brought forward, Company's Rupees			36988	0	0
<i>5th Year.</i>					
To Plantation Establishment		6360	0	0	
" 40 extra Mallies, at 4 Rupees each per month, for 5 months, 160 X 5		800	0	0	
" Native Tea-maker's Establishment		900	0	0	
" Tea-packing Establishment, Carpenters, &c.		900	0	0	
" Extraordinary expenses, carriage of Tea, land rent, extra coolies, &c....		3000	0	0	
			11960	0	0
<i>6th Year.</i>					
To Plantation Establishment		6360	0	0	
" 50 extra Mallies, at 4 Rupees each per month, for 5 months, 200 X 5		1000	0	0	
" Tea-maker's Establishment		1200	0	0	
" Tea-packing Establishment, Carpenters, &c.		1200	0	0	
" Extraordinary expenses, land rent, carriage of Teas, wood for boxes, extra coolies, &c.		4600	0	0	
			14360	0	0
<i>7th Year.</i>					
To Plantation Establishment		6360	0	0	
" 150 extra Mallies, at 4 Rupees each per month, for 5 months, 600 X 5		3000	0	0	
" Native Tea-maker's Establishment		2000	0	0	
" Tea-packing Establishment, Carpenters, &c.		1800	0	0	
" Extraordinary expenses, carriage of Teas, land rent, wood for boxes, extra coolies, &c.		6500	0	0	
			19660	0	0
<i>8th Year.</i>					
To Plantation Establishment		6360	0	0	
" 250 extra Mallies, at 4 Rupees each per month, for 5 months, 1,000 X 5		5000	0	0	
" Native Tea-maker's Establishment		2500	0	0	
" Tea-packing Establishment, Carpenters, &c.		2200	0	0	
" Extraordinary expenses, carriage of Teas, land rent, wood for boxes, extra coolies, &c.		8000	0	0	
			24060	0	0
Rupees			107028	0	0
* By balance in hand as profit Co.'s Rupees			167972	0	0
Total, Company's Rupees			275000	0	0

* From this must be deducted remuneration to Planter, interest on Capital, &c.

Implements used in the Factory.

We have already noticed the implements in general use in the factory; but we may as well again notice them more in detail for the benefit of planters.

Cast iron pans.



FIG. 25.



FIG. 26.

The cast iron pans now in use are of various kinds.

1. (Fig. 25.) Pans used in making black Tea. The pans received from China vary in size, viz., from 21 inches in diameter and 7 inches in depth, to 25 inches in diameter and 9 inches in depth, and by about $\frac{1}{4}$ of an inch in thickness.

2. (Fig. 26.) The English pans are 2 feet 2 inches in diameter, 8 inches deep, and rather thicker than the Chinese. These pans are procurable in Calcutta, and are used in boiling sugar. In building them into oven, the handles require to be removed. The China pans are not procurable in this country.

3. (Fig. 27.) Green Tea pans. These pans are only procurable in China, and are in diameter 19 inches and 12 inches in depth, and furnished with ears to support them when built into oven.

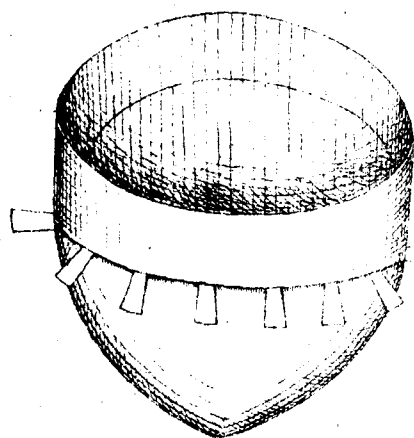
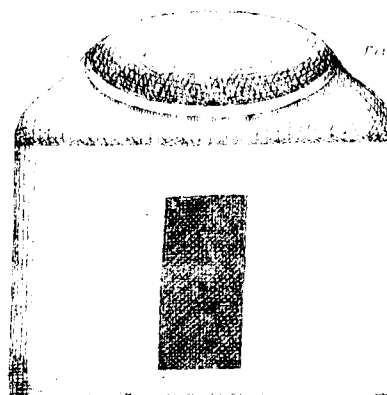


FIG. 27.

The Chinese pans are remarkable for their thinness, and the admirable manner in which they are cast, equalling every thing to be met with in Europe. By Mr. Watson, the Superintendent of Roorkee Iron Work-shops, they were stated to be the finest specimens of casting in their line that he had seen, and he doubted if such could be made in Europe. This shows that the casting of iron pans has reached great perfection in China.

The Fig.

We have shown the manner in which the different kinds of pans are placed in the oven.



The pans are placed at an angle of about 25°, all the others are placed horizontally. The ovens for making black Teas are made of *kutch* brick. In height they are 2 feet 9 inches, and of various length. Thus Fig. 28, of which a lateral view is given to show the door, is 3 feet long. Door 1 foot 5 inches in height, and 11 inches in breadth. The base of the oven is elevated 10 inches above the floor.

The ovens represented where there are eight pans arranged in a line, are

also of *kutch* brick 3 feet in height, and to each pan a space of 3 feet is given, in order to allow the Tea-makers plenty of room to work. The ovens for double pans, for manufacturing green Teas, are also built of *kutch* brick. It is 3 feet 2 inches in height in front, and 4 feet 8 inches behind; the door for inserting fuel is 1 foot 2 inches high, and 7 inches wide, and 10 inches from the base. By placing the pans in pairs, they can be worked at one and the same time by both hands. All the ovens are faced with good mortar.

The following implements are made from bamboos and ringals which everywhere abound throughout the Himalayas:—

(Fig. 6.) Brush made of split bamboo used in sweeping the Tea leaves out of the pans when they have been sufficiently heated. These brushes are of various sizes.

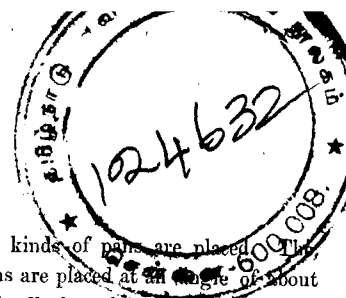
(Fig. 7.) Basket for receiving Teas from the pan. It varies in size. Those in general use are 2 feet long and 1½ feet broad, and gradually increases in depth from front to back 6 inches. They are made of bamboo.

(Fig. 12.) Flat basket made of bamboo for spreading out the Tea leaves. These flat baskets are of various sizes, varying from 3 to 5 feet in diameter.

(Fig. 13.) Flat sieve basket. These sieves are 2 feet in diameter, and are used in placing the leaves on, when they have been rolled on the mat, and then deposited in the double coned baskets. These sieves are made of ringal, and a large number of them are required in the factory, as they are so soon destroyed by the heated charcoal. When used, they are placed on a stiff mat made of bamboos 3 feet in height, and which is made in the form of a funnel around the choolah. The basket is then placed on the top of this funnel.

(Fig. 22.) Conical shaped basket turned up at the end. These baskets are 2 feet in diameter, and taken towards a point, and are made of ringals.

(Figs. 14.) Double coned basket. The height of these baskets varies from 2 feet to 2 feet 6 inches, external diameter, 2 feet 8 inches in the centre at a 2 feet; here



3451.24 ms

there are some small bamboo pegs placed to support the flat sieve basket on which the Tea rests. They are entirely made of bamboo.

(Fig. 5.) Forked sticks for moving Tea leaves when roasting in the pan, when they become too hot for the hand.

Choolahs. These are formed of *kutch* bricks, and faced with mortar, and are 10 inches high, 10 inches deep, and generally about 2 feet in diameter.

In Fig. 15 a double coned basket is represented placed on a choolah.

(Fig. 16.) Small funnel made of bamboo, and sometimes placed in the centre of Teas when put into conical baskets, to allow the heated air coming from the choolahs to pass through. It is seldom used, the Tea-makers preferring one made in the Tea with the hand.

(Fig. 1.) Baskets for collecting leaves. These baskets are generally 1 foot broad by 10 inches deep.

(Fig. 2.) Baskets for carrying leaves to the factory. These baskets are made of bamboo, and are generally from 3 to 4 feet in diameter, and 8 inches in depth.

(Fig. 29.) Mat made of ringal. It is of various dimensions, depending on the size of the table, and the number of men at work.

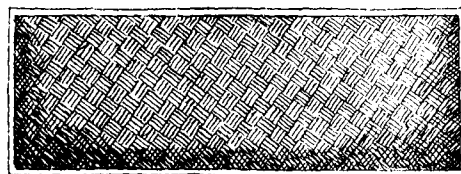
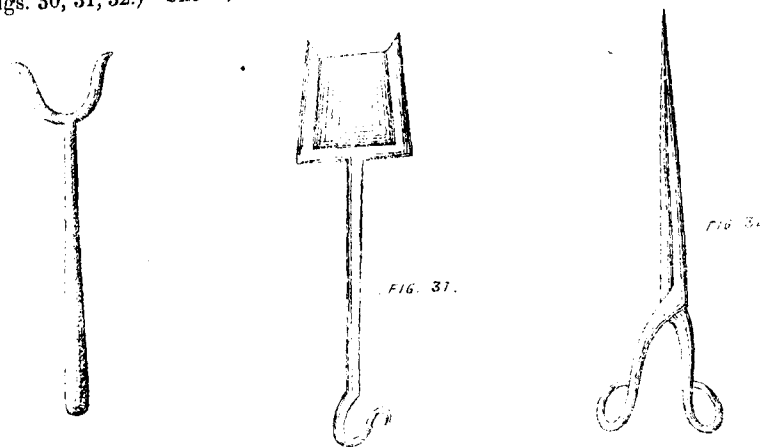


FIG. 29.

Sieves for winnowing and separating the different kinds of Teas. These are made of cane, and are procurable in this country, but can be purchased in any number in Canton. They vary in the size of the meshes, and range from 1 to 12 or 14. Without them, the different kinds of green Teas cannot be properly separated. The chair-makers in India might be able to make them. As yet, however, the Government Plantations have been entirely supplied from China. But all the more common sieves, mats, and baskets used in the factory, can be made up in the Plantation from the bamboo and ringals procurable in the country.

(Fig. 11.) Frames for drying Teas, &c. These frames are of various dimensions, according to the size of the factory rooms, and quantity of room required, and consist of three or more stages, as in Fig. 19.—accommodation is economized.

(Figs. 30, 31, 32.) Shovel, tongs, &c., used in regulating the heat of the ovens.



(Fig. 33.) Winnowing machine. This is a common winnowing machine, with a

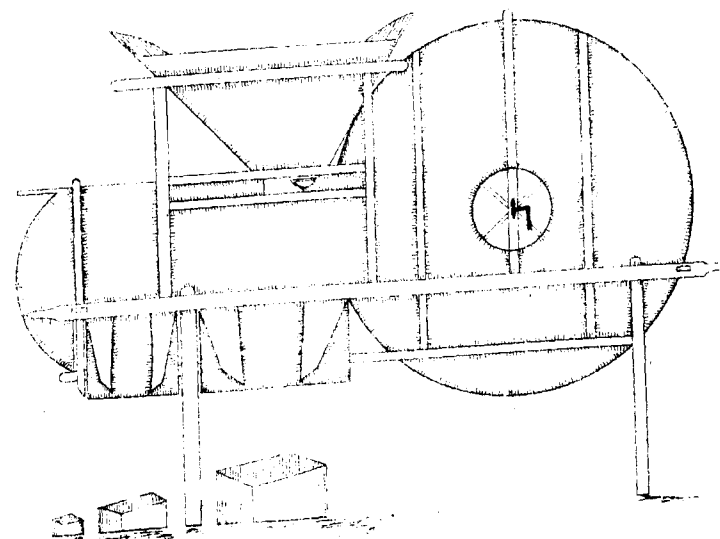
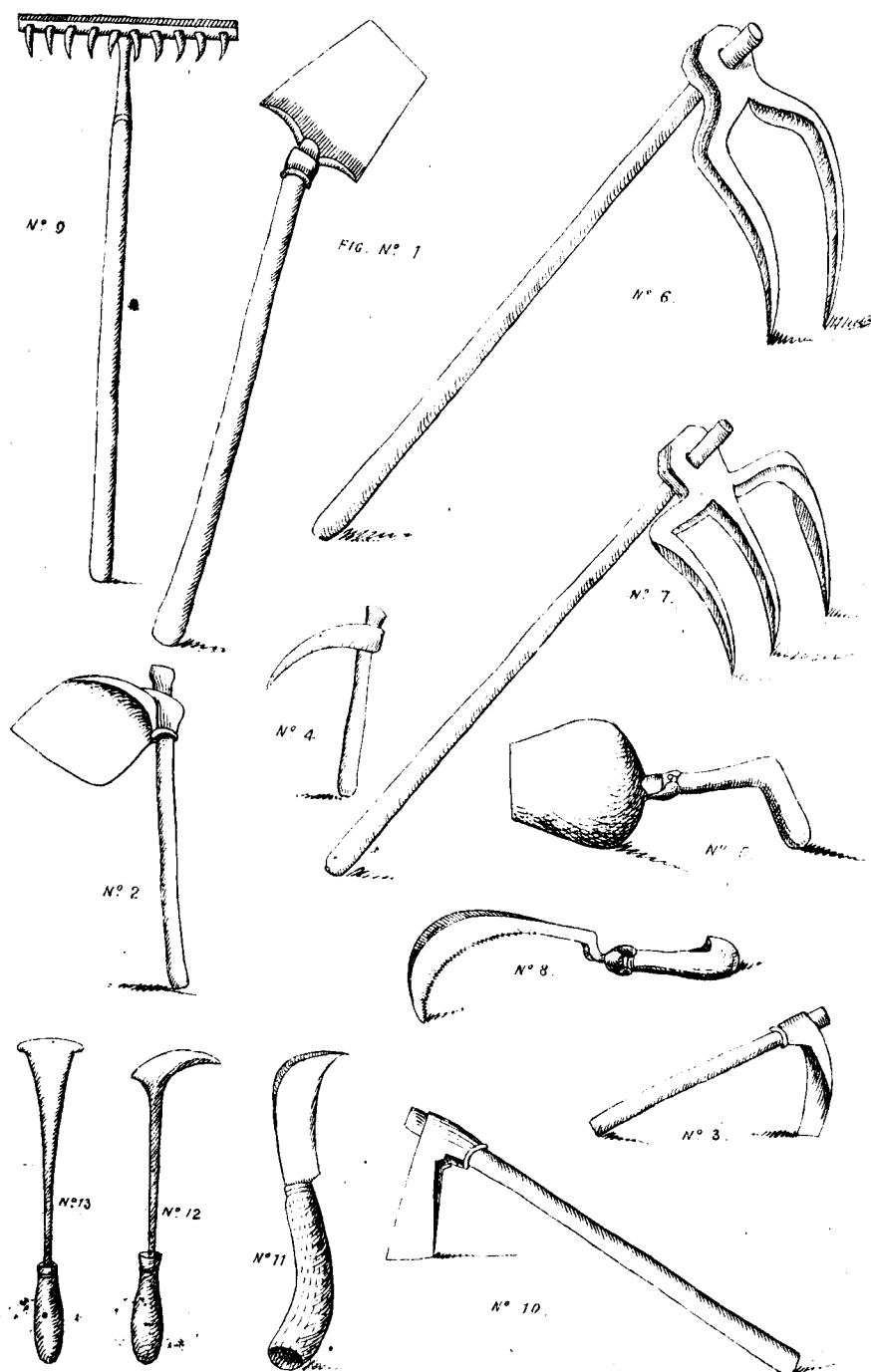


FIG. 33.



(Fig. No. 4.) Pointed kootla, for stony ground. It is about 14 inches long by 1½ inches broad at the shoulder, and 12 chittacks or 1½lbs. in weight. Value, from 4 to 6 annas, or from 6d. to 9d.

(Fig. No. 5.) Koorpa or hand hoe for removing weeds. It is 7 inches long by 5 inches broad at shoulder, and 4 inches at edge, and about 8 chittacks or 1lb. in weight, with a handle about 9 inches long. Value, 4 annas or 6d.

(Figs. Nos. 6 and 7.) Grass forks two-teethed and three-teethed. These forks are useful in removing weeds, and breaking up the clods, after the land has been well trenched with the phowrahs. They are 10 inches long by from 4 to 6 inches broad, and from 2 to 2½ seers, or from 4 to 5lbs. in weight. Value, from 10 to 12 annas, or from 1s. 3d. to 1s. 6d.

(Fig. No. 8.) Drantee or sickle for cutting grass. It is from 10 to 12 inches long from shoulder to point, by 1½ inches broad in middle, with a handle 8 inches long, and 4 chittacks or half a pound in weight. Value, 3 annas or 4d.

(Fig. No. 9.) Rakes for removing weeds. It is about 14 inches wide, with 10 or 12 teeth. Value, 14 annas, or about 1s. 9d.

(Fig. No. 10.) Axes for cutting timbers. They can be obtained of any size, at about 2½ seers or 4½lbs per Rupee, or 2 shillings.

(Fig. No. 11.) Pruning knives country made. Value, from 2½ annas to 3 annas, or from 3d. to 4d. each.

(Figs. Nos. 12 and 13.) Weed knives, a pound in weight. Value, 3 to 4 annas, 4½d. to 6d.

In a Plantation in the Deyrah Dhoon, a few carts, either country or English, for manure and wheel-barrows, will also be necessary. Country carts, with iron bound wheels, will cost about 35 Rupees, or £3-10s. each. It is necessary to bind the wheels with iron, as the roads are very strong. Kranchees, or English carts, from 50 to 60 Rupees, or from £5 to £6 each. Wheel-barrows, about 12 Rupees, or £1 to 4s. each. To wrok the carts and ploughs in the Deyrah Dhoon, bullocks will be necessary, and they can be purchased at from 60 to 80 Rupees, or from £6 to £8 per pair, and in the hills, small bullocks are available at from 16 Rupees to 30 Rupees, or from £1 12s. to £3 per pair.

(Signed) W. JAMESON.

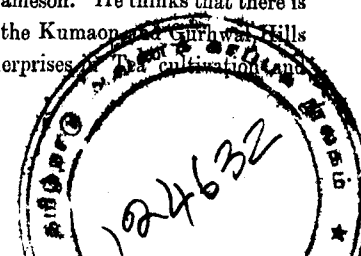
OFFICE OF SUPDT. BOTANICAL GARDENS; }
Sukharunpore, the 24th March 1857. }

(True Copy)

R. C. OLDFIELD,

Asst. Secy. to Govt., N. W. P.

The Lieutenant Governor very much concurs in the general conclusions which have been stated in the letters of Captain Ramsay and Mr. Jameson. He thinks that there is no ground to doubt that there is abundant room in the Kumaon and Gurhwal Hills for a considerable number of separate and successful enterprises in the cultivation and



manufacture upon a moderate scale, and he would not as yet withdraw facilities and encouragement from such enterprises by making over, without reserve, the Government Plantations, Factories and Establishments to any large single Company.

No. 2109 A. of 1855.

Revenue Department, North-Western Provinces, Head Quarters, the 26th of September 1855.

NOTIFICATION.

GRANTS of land for Tea cultivation in the Kumaon and Gurhwal Districts of the Kumaon Province will be made on the following conditions, on application to the Senior Assistant Commissioner of the District.

2. Each grant will be of not less than 200, or more than 2000 acres. More than one grant may be taken by one person or Company, on the applicant satisfying the local authorities acting under the usual control in the Revenue Department of their possessing sufficient means and capital to undertake an extended cultivation and manufacture of Tea.

3. One-fourth of the land in the grant will be given free from assessment, in perpetuity, on fulfilment of the conditions below stated.

4. The term of first lease will be for 20 years. For the first four years, the grant will be rent free; in the fifth year, one anna per acre will be charged on three-fourths or the assessable portion of the grant; two annas per acre in the sixth year; three annas in the seventh year, and so on, one more anna being added in each, till, in the last year, the maximum rate is reached of 1 Rupee per acre. The full assessment on a grant of 2,000 acres will thus not exceed 1500 Rupees per annum.

5. The following are the prescribed conditions of clearance:—

At the close of the fifth year from the date of grant, a twentieth part of the assessable area; at the close of the tenth year, one-fifth of the assessable area; at the close of the fifteenth year, half of the assessable area; and at the close of the last year, three-fourths of the assessable area, is to be cleared and well stocked with Tea plants.

6. In the twenty-first year, on the fulfilment of the above conditions, the proprietary right in the grant and the right of engagement with Government, shall vest in the grantee, his heirs, executors or assigns, under the conditions generally applicable to the owners of estates in Kumaon; and the rate of assessment on the lands in the grant, in whatever manner cultivated, shall never exceed the average rate on grain crop lands in the same locality.

7. On failure of payment of the prescribed assessment in any year, or of any of the above conditions, (the fact of which failure shall, after local enquiry conducted by the Senior Assistant Commissioner, be finally determined by the Sudder Board of Revenue,) the entire grant shall be liable to resumption, at the discretion of the Government, with exception to the portion of the assessable area, which may be *bond fide* under Tea cultivation, and to a further portion of land which shall be allowed

perpetuity free of assessment to the extent of one-fourth of such cultivated area. Portions so exempted will remain in the possession of the grantee, subject to the rates or rules of assessment in the District.

Grantees shall be bound to erect boundary pillars at convenient points round the suit of a grant within six months from its date, failing which such pillars will be put by the Government Officers, and the cost thereof shall be recoverable from the grantee, in the same manner as the regulated rate of assessment.

9. No claim to the right and interest in a grant on any transfer by the original grantee, will be recognized as valid, unless on registry of the name of the transferee in the Office of the Senior Assistant Commissioner.

10. So long as Government establishments for the experimental growth and manufacture of Tea shall be maintained in the Provinces, supplies of seeds and plants will be given gratis to grantees, on application to the Superintendent Botanical Gardens of the North-Western Provinces, as far as may be in his power.

By order of the Hon'ble the Lieutenant Governor of the North-Western Provinces.

(Signed) W. MUIR,

Secy. to the Govt. of the N. W. Provinces.

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