

THE RECENT TEA DEVELOPMENTS IN RUSSIA.*

In the year 1914 Dr. G. D. Hope wrote a most interesting and informing article in the Quarterly Journal of the Scientific Department of the Indian Tea Association, giving an account of his visit to the tea districts of Georgia in the Trans-Caucasian provinces of Russia. He described the conditions under which tea was then grown in this region and indicated the extent of the industry at that time. However, the interest in the matter at that time was limited for there was no prospect of the rapid extension of tea cultivation in this part of the world, and, beyond the small area of tea grown by the peasants and a few small private owners, the whole of the Georgian tea was in the hands of the Czar himself and one or two rich Russian merchants. The whole area under tea amounted to about 2,000 acres or a little less, and this tea, except such as was in the hands of the peasants who planted it for their own use, was worked by Chinese methods and Chinese men who were responsible for the gardens and for the manufacture of tea.

At the Revolution the tea passed into the hands of the State, but for several years this made little difference in the method of working, and practically no extension of the tea planting in Georgia occurred. But about 1926 a scheme was launched for the increase of the area under tea, and investigations were begun to find out the amount of land with a suitable climate which could be made available for growing tea in Trans-Caucasia. All investigations led to the conclusion that the successful growth of tea would probably be limited to Western Georgia, but that within this area there was enough available land for a very large extension of the industry. Since then progress has been rapid. The new tea planted in 1926 amounted to under 70 acres but in 1927 nearly 1,500 acres were planted and over 5,000 acres in 1928. At present the land under tea in Western Georgia amounts to about 55,000 acres and the present intention is that, within about three years, this area will be multiplied between about two to three times. Such an area, as will be seen, will be a substantial factor in the future supply of the tea world, though, with the increase of prosperity in Russia, it is estimated that that country alone will much more than absorb all the tea that Georgia can produce, without affecting her present imports from the other tea-producing countries of the world.

But in view of the present circumstances it may be worth while to review the conditions under which tea is produced in Georgia in

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a slightly more detailed manner than was done by Dr. Hope in 1914 when tea planting was little more than a hobby of an emperor and certain rich merchants.

The tea area of Western Georgia lies in a triangular area of land at the extreme east of the Black Sea. This is enclosed on the north by the Caucasus Mountains, on the south by the Armenian Mountains, on the east by the ridge which joins these two mountain ranges. It is open on the west. Under these circumstances it receives a rainfall greater than in almost any other part of the Soviet Union. The rainfall is fairly well distributed throughout the year. This area is also protected from the winter cold which prevails in practically all other parts of Russia, and thus, though the winter temperature is lower than we are accustomed to associate with tea cultivation, yet the area is entitled to class itself as sub-tropical.

Coming to details, the actual rainfall varies from 100 inches near Batoum to about 50 inches in the northern part of Western Georgia. The distribution of this rainfall at Chakwa, which was the first tea centre, is shown in the following average figures for each month of the year.

| | | | Inches. |
|-----------|-----|-----|-------------|
| January | ... | ... | 10·00 |
| February | ... | ... | 6·80 |
| March | ... | ... | 5·76 |
| April | ... | ... | 5·76 |
| May | ... | ... | 4·56 |
| June | ... | ... | 7·44 |
| July | ... | ... | 7·12 |
| August | ... | ... | 9·28 |
| September | ... | ... | 10·68 |
| October | ... | ... | 12·12 |
| November | ... | ... | 10·68 |
| December | ... | ... | 9·76 |
| | | | <hr/> <hr/> |
| | | | 99·96 |

The main difference between this rainfall and that of the best Indian tea districts lies in the fact that so much of the rain falls in the cold weather. Much of this rain, in fact, falls as snow and it is quite interesting to see photographs of the tea almost covered with a thick layer of snow.

The rainfall just given, however, represents the best conditions of the area. In the northern and eastern portions, the total rainfall is much lower and in some cases, where tea has been planted, it does not much exceed 50 inches per annum. Moreover, the distribution is not so good as that found at Chakwa, and there is liable to be

drought in April and May, when the tea should be growing as vigorously as possible. The total quantity and the distribution of the rainfall limits to a very marked extent the actual area which is fit for tea planting, and most of the centres for which details of rainfall were given by Dr. Hope in 1914 are now recognised as being quite unsuitable for tea. But even if these centres are left out, there still remains a very large portion of Western Georgia in which the rainfall at least is fairly satisfactory for tea.

On the other hand, in no part of Western Georgia are the temperature conditions really satisfactory, and, even at the most favourable points, the months from November to March are much colder than is desirable for tea cultivation. Even near Batoum, which represents the mildest climate in the country, the minimum temperature during these months may go as low as 22°F. (-5.7°C.). It is true that this low temperature does not occur every year, but in most seasons it goes low enough to damage seriously the higher jâts of tea. I have myself seen young tea shoots nipped off by frost in the early part of December in this very region. In the remainder of the area the conditions are liable to be even more severe, and there are records of temperatures as low as 10°F. (-12°C.). Of course, such temperatures are very occasional, and the normal minimum winter temperature is much higher than this, but the possibility of the occurrence of such low temperatures will always make tea planting difficult and will prevent the use of the more delicate types of tea. The coldest month is February, and, as will be quite clear, this has an important bearing on the way in which the winter work of the tea garden can be carried out and on the date at which plucking can commence in the following season.

The extent of the long cold weather, which I have tried to describe, will tend, of course, to reduce the length of the plucking season, and, hence, the quantity of tea which can be obtained per acre. On the other hand, the climate during June, July, August and September is very suitable for the vigorous growth of tea, and there seems to be no reason why during the height of the season very strong and vigorous flushes of leaf should not be obtained.

Turning to the question of the soils of Western Georgia, it may at once be stated that hitherto practically all of the tea that has been planted has been put out on the low hills and plateau lying at the foot of the great mountains to the north and south of Western Georgia. Between these and the Black Sea there lies a region of flat clay land and swamp very little above the flood level of the rivers. Most of these lands, even when drained, do not seem likely to be suitable for tea and under the present arrangements in Russia they are likely to be utilised for other commercial crops. On the low hills and plateau

to which I have referred, there has been only a limited amount of cultivation hitherto, though in suitable places, grapes and certain of the hardier types of oranges (tangerines chiefly) have been cultivated extensively and will be cultivated more in the future. The main food crop of the people is maize, which is grown both on the low flat land to which I have referred and on the plateau and hill land which is suitable for tea.

The soil of these low hills and plateau lands varies a good deal, but most of them consist of a red soil with a somewhat heavier and yellower sub-soil. At intervals among this type of soil and sub-soil one comes across a sandier surface soil with gravel underneath. In fact a very large part of the area reminds me very much of a good deal of the teela and plateau land of Cachar and will probably have all the difficulties which have been found on such land in India. The soils of the original tea area near Batoum, Chakwa, and Osurgetti have been very carefully and thoroughly studied by Professor Zakharoff, and I doubt whether a more thorough study of soils in any particular place has ever been made in any part of the world. His studies show that all these soils contain very little lime—as indeed is necessarily the case if tea is to flourish. The acidity of the soil varies of course, but is usually represented by a pH value of 5.0 to 5.5.

Similar soils are found in other parts of the region, though the impression I got was that on the whole in the northern and eastern parts of the area the soils are poorer and less suitable, while there are apt to be patches of land which seems to be spoilt for the purposes of tea by the presence of a substantial amount of calcium carbonate.

The general impression which I get of the soils of Western Georgia as compared with those of north-east India is that on the whole they are poorer than most of those usually planted in the Indian tea districts. However, while it is usual in India for the sub-soil to be fairly light (though of course examples of heavy soils occur even on plateau land), in Georgia the sub-soil usually appears to be heavier than the surface soil. This at once introduces difficulties with regard to the drainage and with regard to the securing of deep root development for the tea plant.

At this point I may say that the analysis of soil from Chakwa given by Dr. Hope in 1914 does not represent the ordinary common type of tea soil in Georgia. It shows far more lime than is usually found and moreover suggests more clayey soil than is generally utilised. On the other hand the amount of organic matter shown by Dr. Hope is much higher than is generally found in almost any part of the Georgian tea area.

The original tea which was planted in Georgia consists of hybrids obtained from various sources, China, Japan, India and Ceylon. Originally high jât seed was obtained from Assam but the plants from this source were found to be unable to resist the winter cold and were gradually abandoned. In fact, of the old tea now growing in Georgia, the best jât that I found was from seed said to have originated from Ceylon. It was very mixed, but among the plants were some which were decidedly good jât.

With the new development since 1926 there have been renewed efforts to find out whether any of the better jâts of tea can be utilised in Georgia. So far results indicate that the suitability of the genuine Assam Indigenous or Manipuri types is limited, and it is pretty certain that they will only be useful for commercial tea in a very small portion of the area. For the rest, the land has been planted with hybrid and China tea derived in part from India (chiefly from the Darjeeling district), from Japan, and to a less extent from Ceylon, while a large part of the new area has been put out with seed derived from the old bushes already growing in Georgia itself.

It is, of course, a very serious handicap to tea cultivation in Georgia that the really high types of tea cannot stand the climate there, but the handicap is greater than appears at first sight, because, while high jât tea seed can be obtained so as to give fairly uniform plants, it seems at present impossible to get hybrid or low jât tea seed which give plants of uniform productive power, for the seeds are usually collected in India, Ceylon, Japan, or even in Georgia itself, from a mixed lot of plants which are themselves of very unequal productive power. Hence it will be seen that it is of prime importance that the young plants should be carefully selected so as to reject those which give little leaf and a large quantity of flower and seed. It is in fact, a great desideratum that a method should be devised whereby the productive power of any plant can be judged with some approach to accuracy from the condition of the plants at an early stage. Such methods do not appear to be worked out for seedlings in any tea-growing country, but it is one of the matters to which considerable attention is being given in connection with the new tea area in Georgia.

Most of the land so far planted during the last three or four years has been put out "seed-at-stake", and the tendency is for "hedge-planting" to be adopted, for reasons which will shortly appear. The distance between the rows is usually $5\frac{1}{2}$ feet (1.75 metres). In future, nurseries will be used to a very much greater extent than has been done hitherto though it is intended to carry on "seed-at-stake" planting on a very considerable part of the area. During the last and the present seasons, under this latter method,

large numbers of seed are planted in the row, a method which allows the removal of a considerable portion of undesirable plants later on, while still leaving enough to form a satisfactory hedge of plants. Planting is usually done between January and June. The seed put out in the later months, that is to say in April, May and June, even in the climate of Georgia, is likely to be burnt off by the sun just above the ground and so give unsatisfactory plants later on. Undoubtedly, the best time for planting tea seed in Georgia is in the first three months of the year.

The growth of plants under Georgian conditions is, of course, slower than is customary on the plains of India, but it does not differ widely from that on well-prepared land in the Darjeeling district. The critical time with the plants, however, seems to be the first cold weather, and at this time a certain proportion of the plants from every class of seed hitherto used have been killed. The difference between the resisting power of seed from various sources is very remarkable and from the results and tests made the choice of sources of seed in the future will be determined. In view of the heavy sub-soil which is usual in Georgia, it has proved to be of great importance to loosen the sub-soil into which the roots penetrate and the difference between the growth of plants where this is done and where it has been omitted is very remarkable indeed.

One of the features which will strike an observer from India is the extent to which mechanical methods are adopted in connection with all possible operations in tea culture. Thus, for instance, wherever the slope of the land allows, the soil is prepared for planting by the use of heavy tractors, ploughs and sub-soilers. Further, almost all inter-cultivation of the tea after planting is done by machines, and after much experimenting the actual machine used for this purpose is a small petrol motor cultivator made by Siemens-Schuchert of Germany. The inter-cultivation done by this machine is very satisfactory, so far as I can judge, and enables about two-and-half acres to be cultivated in a day of eight hours, using one and three-quarter gallons of petrol. This machine, of course, does not actually keep the soil loose in the rows themselves and this must be done by hand, but over about 75% of the land it certainly seems to do very well and very much better than all the attempts I have seen at cultivation of tea by animal power.

A very considerable portion of the tea already planted lies on slopes which tend to erode badly, just as has been the case of the steep slopes of both India and Ceylon, and as a result it is quite clear that the prevention of such erosion is one of the biggest problems which face those who are now responsible for tea cultivation in Georgia. Careful terracing was adopted in parts of the early planted tea

gardens, but a method for dealing with the heavy slopes which has now been decided upon is that of planting in contour trenches about eighteen inches deep which are made by hand and then filled in as far as possible with surface soil. In addition to this, cross drains are put in on all but the slightest slopes, as the heavy sub-soils render such drains dug down to a depth of three feet almost a necessity for the production of healthy tea.

From what I have seen during the past two years I think it may be taken that the tea in Georgia will begin to yield in the fourth year after planting, and I should, say, on the whole, that the plants are likely to be nearly a year later in reaching their full growth of yielding power than is customary in the plains of India. Plucking has hitherto been done on a system which has been tried and rejected in the more advanced tea-growing countries. The actual number of pluckings has been small, as is still customary in China and Japan, with the result that the bushes have largely "run away" in the middle of the season, and so closed up before the end of September. This of course, has been partly caused by the lack of a sufficient amount of labour for plucking—a lack which will be difficult to supply in the future and which forms perhaps the biggest obstacle to Georgian tea cultivation.

This leads me to what is perhaps the most interesting development of mechanization which has been attempted in connection with Georgian tea culture. Mechanical plucking has been usually looked upon in the East Indies as an impossibility, and everyone, both there and elsewhere, recognised that no mechanical method of plucking can be imagined which does not cause much bad, torn and broken leaf to be plucked, but all the same the Japanese have used for many years a system of plucking by shears which is said to increase sixfold the plucking capacity of each worker. These Japanese shears are now in general use on the estates in Georgia, though, on the smaller plots hand-plucking is still carried on. The workers in Georgia have, however, gone one stage better than the Japanese shear, and now at least two machines have been devised which will pluck the leaf far more regularly and at a still more rapid rate. Of course, the use of these or any other mechanical method of plucking will require that the bushes are definitely shaped to suit the method, and that the plucking shall be more frequent than has been usual in Georgia in the past. In spite of everything, at the best, there will be a very large amount of broken leaf, and it is recognised as necessary that the leaf going into the factories shall be sorted out so as to separate, as far as possible, the cut leaves and tips from the properly plucked shoots. This matter is, in hand, and one pneumatic method of such separation has already been devised and is in use at the Chakwa factory.

Only one-third of the tea area which will ultimately be planted in Georgia will be in the form of estates such as we know them in the East Indies. Even at present, a very large proportion of the tea area is cultivated by peasants who either make the tea themselves by hand methods or, as is now more frequently the case, send it to one of the small factories which are being dotted about the tea areas, and extension of this peasant tea, in the form of collective holdings ("Kolkhoz"), is one of the most interesting developments at the present moment. The importance which is attached to it may be judged by the fact that out of fifteen factories now in existence in Georgia, about ten are devoted to the manufacture of tea so produced.

This leads me to the question of factories, and I may say at once that those which have been erected during recent years are of very good design and are equipped with the latest machinery. The factory at Chakwa, in the original home of tea in Georgia, is a very large one even according to Indian standards. In this, as elsewhere, the latest methods of the East Indies have been copied and most of the machinery is of a similar type to that used in the most up-to-date plantations in the East. Under the conditions in Georgia it is clear that withering of the leaf must be of a more or less controlled type, and withering in lofts with fans is, therefore, usual.

Though all the mechanical devices customary in the East have been adopted in the factories, yet the Russian workers are not by any means satisfied with the amount of mechanization hitherto attained. In fact, as in other industries in Russia, there is at present a passion for mechanization, in order that labour may be saved, and I should not wonder that within a year or two the Georgian authorities may be able to reach a degree of mechanization which has not been attained elsewhere in the world.

The tea produced hitherto has been of a very ordinary type. A recent London Market opinion on these teas read as follows:—

"All are clean sweet liquoring teas of nondescript neutral character with no trace of commonness or burn. They evidence careful manufacture and grading, and indeed are a most interesting lot. It remains to be seen whether from the climate and soil of Georgia it will be possible to produce any characteristic flavour."

The lack of quality in Georgian teas indicated by this opinion may probably be partly due to the essential conditions of tea growing in Georgia but it is also largely a result of the methods of pruning, and partly of plucking systems. It is likely that the general crop of tea will improve though at present I cannot picture the production of a really good and flavoured tea in the country.

As would be expected from what has been already written, the yield of tea per acre in Georgia is likely to be considerably below what we are accustomed to get in the plains of India. If, however, we compare the yield in Georgia with that which it is customary to obtain in the higher estates of the Darjeeling district, it will be found that the old tea in Georgia is now yielding at least as highly as most of these gardens. In 1930 the old tea in Chakwa was giving about 350 pounds of made tea per acre. With the adoption of better methods and the use of considerable quantities of manure this yield was raised in 1931 to between 400 and 500 pounds of made tea per acre. As far as one can estimate, I should think that with careful treatment, that is to say, good cultivation and pruning, and plucking by more modern methods, it ought to be possible to get nearly 450 pounds of made tea per acre without heavy manuring on well-grown matured tea using the fairly coarse plucking which is at present in vogue in Georgia. This, it will at once be recognised, is a relatively small yield when the quality of the tea is, at the best, only medium, and hence it is looked upon as very important that this yield should be increased by means of manuring. Hence large numbers of experiments in manuring are being carried out both on mature and on young tea in various parts of the already planted area. As in most other places increase in yield follows very closely the amount of available nitrogen in the manure used, but the quantities used are very much greater than what we have been accustomed to consider normal in the Indian tea districts. It is probable, however, that manures, especially nitrogenous manures, will be quite cheap in Russia in the future, so that it will be possible to apply such manures on a very extended scale. It is hoped, in fact, (and I think the hope is a reasonable one), that a yield of between 600 and 700 pounds of made tea per acre on well-grown mature tea will ultimately be produced. The extensive use of heavy dressings of manure is one of the points in the plans for tea culture in Georgia which will place the industry in a rather different position from what would be expected otherwise.

At present, in Russia generally, there is a very great belief in the value of scientific assistance in connection with the development of industries, and in no industry is that value more emphasised than in the case of tea development. There has, in fact been established already what is termed the "All-Union Tea Institute". This is really a large scientific institute for the study of the problems which tea culture in Georgia presents. The centre of the Tea Institute work is a very fine laboratory building situated at Osurgetti in the heart of the new tea areas, and it has branches furnished with small laboratories at two other centres namely, Chakwa, the original home of tea in Georgia, and at Zugdidi, the central point in the northern part of

the districts. These centres are well supplied with highly-trained scientific experts, from whose work we may expect very many results of great importance in the future. The matters which are being studied at present are of course, those which are specially important for tea in Georgia. Thus, for instance, a most elaborate study has been, and is being made on the resistance of various types of plants to frost and quite important results have already been obtained. I expect that within a very few years it will be possible by mere inspection to mark down the plants which are likely to resist frost and also to be good yielders of leaf.

Again, in other parts of the world's tea area it has not been a matter of supreme importance to breed special types of tea plants, because many of the recognised jâts of tea from India were extremely good, and suitable for almost all the conditions prevailing in India, Ceylon or Java. On the other hand, in a region like Georgia which is almost on the limits of tea cultivation, one of the most important matters of investigation is to find the most productive type of plants, which will stand the conditions which prevail during the winter in the country. The development and growth of such plants, so as to produce as large a quantity of tea as possible to supply the needs of Georgia, is likely, of course, to be a matter of many years of work, but it is recognised that, though this is the case, it is essential that it should be proceeded with.

Moreover, it will be seen that the question of vegetative propagation takes on a new importance under these conditions. Of course, tea plants have been propagated vegetatively in Assam as well as in Ceylon and Java for many years, and has been the hobby of a considerable number of planters. I remember seeing accounts of work in this direction as far back as the 'seventies of the last century, but the matter has not been of vital importance where seed of good and reliable type, suitable to the circumstances, could always be obtained. Where this is not the case, the matter takes on a new importance and hence a considerable amount of study is being devoted to working out practical methods by means of which the plants can be propagated vegetatively on a commercial scale.

Another matter to which a good deal of study is being devoted is that of the best way in which erosion can be prevented in Georgian conditions. The matter is not so simple as seems to be the case at first sight, for any method adopted must be one which ultimately leads to the greatest economy of labour. In this, as in so many other matters, the question of labour economy is very important indeed.

It would be impossible here to indicate even in outline the lines of investigation which are being taken up with enthusiasm by the scientists now attached to the Institute in Georgia. On the whole,

now, the work is of a very much more practical character than it was when I first went to Georgia in 1930. Experience is being gained, and as a result the directions of research are being modified so as to deal more with the actual practical problems of tea cultivation and manufacture than was the case until recently.

In one matter I have particular admiration for the way in which the subject is being approached, namely the study of tea manufacture both as a scientific and a practical problem. In no direction does it seem that less progress has been made in tea study than in the knowledge of what actually goes on during tea manufacture. In spite of the large amount of study given to this matter in the last thirty years we are still very largely in ignorance of what happens during black tea manufacture, and what are the causes of the changes which take place. This problem is being approached now in Georgia by a group of men, who, I feel confident, will make a very great deal of progress during the next few years.

Considered as a practical process, tea manufacture has, of course, enormously improved since the time when I first came into touch with it, but on the whole these advances have been in two directions. The first of these is on the engineering side, whereby the machinery then used has been replaced by far more economical and efficient types than was the case in those days. On the other hand, by the adoption of far more cleanliness in tea factories and by creating conditions of moisture and temperature under which both withering and fermenting proceed most favourably, a great deal has been done to bring tea manufacture under closer control than was formerly the case. But the Russian scientists, impelled again by the scarcity and expensiveness of labour, have already got the conception of tea manufacture as an entirely automatic process—at least from the point at which the leaf leaves the withering houses, and they are proceeding with very active work with this aim in view. How far they will be successful, only time can show, but I should not be surprised that the entry of these efficient minds and sufficient enthusiasm into this study may lead to developments which have hardly struck the imagination of workers hitherto.

This is not the place nor the time to give an estimate as to what will be the importance of Georgian tea cultivation in future to the world in general and to the old Indian tea industry in particular. It is still not clear how far the plans which have been made will be completely successful, that is to say how far the tea area, which it is planned to put out, will be of the yielding power which I have indicated as to be expected from good mature tea. But, it is, nevertheless, quite clear that with all the developments that can take place, in Georgia at any rate, Russia can never be entirely dependent,

for its tea supply, on tea produced within its own borders. With increasing prosperity in Russia it is hence probable that the demand for tea from the rest of the world will never be less than it is at the present moment, so that Indian tea planters may look with interest and without concern on the development of tea cultivation in Georgia.
